RAILROAD GAZETTE

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# Contributions.

## The Freight Claim Department.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Referring to what has already been said in the *Railroad Gazette* in regard to the freight claim department, it may not be inappropriate to make some additional remarks which will, perhaps, serve to assist the fair minded freight claim agent in his arduous labors, and to induce fair minded claimants to view with proper consideration the character of those labors, and to await with more patience the length of time sometimes required for the adjustment of their claims. The freight claim agent has unquestionably "come to stay," and one by one the important railroads are recognizing the value of such an officer as an adjunct to the general freight department by appointing one.

To be successful, the freight claim agent must be *en rapport* with his immediate superior—the head of the general freight department—and must have sufficient clerical force to have the work of his office performed as systematically and expeditiously as the intelligent and progressive merchant of the present day has the work in his counting-house performed. The first of these conditions is generally fulfilled, the source of his appointment compelling the claim agent to be in thorough sympathy with his chief; and it is the general testimony of those who are in a position to judge that he carries out the policy of his company touching claims, and that the policy of the majority of the railroad companies is to treat all claims fairly and justly, and frequently more than justly. Regarding the second condition, the freight claim agent frequently starts handicapped. That is to say, the general freight agent, after allowing his office to become overwhelmed with claims, on account of being compelled to give his attention to other pressing matters, finally appoints a freight claim agent, who begins his duties with this vast accumulation of claims, but with an insufficient clerical force to dispose of them expeditiously, in addition to the new claims that are presented to him from day to day. It would be good policy for the management of all the railroads to furnish their claim agents with all the clerks necessary to dispose as rapidly as possible of the mass of claims which are unquestionably at present burdening the files of their offices, and retrench afterwards to the basis of a proper disposal of current business.

The management of railroads should commend promptness in the settlement of just claims, for thereby their patrons are prevented from becoming dissatisfied. The intelligent managers of our railroads certainly do not judge the freight claim agent by the aggregate amount of the payments resulting from the claims adjusted in his office, but by the number and the character of the claims he handles, for it may be necessary to handle two or three thousand claims for petty overcharges, etc., ranging from 50 cents to $10, to produce an aggregate of $10,000, whereas a single claim, as the result of a wreck, will sometimes be for that amount.

It is unquestionably true that there are too many unnecessary claims, particularly as regards simple overcharges. A shipper or consignee of local freight (that is, freight from one station to another station on the same railroad), should never be compelled on any well organized railroad to present such a claim to the freight claim agent. If the system of local freight tariffs is not sufficiently simple and perfect to prevent errors in way-billing, then the system of communication between the station agents and the general freight department should be sufficiently rapid, and the system of accounts sufficiently elastic, to render it unnecessary for the overcharged party to deal with any one besides the station agent who makes the collection of the freight charges. The same may be said of some claims for overcharges on through freight (that is, freight shipped from a station on one railroad to a station on another railroad, and sometimes passing over one or more intervening roads), but not all. Railroads should endeavor to collect the correct amount of freight charges only, and a good rule to observe in cases where consignees complain to the agents who make the collections of alleged overcharges is for the agent to ask the advice of his general freight agent, and if the through freight tariff which governs is at hand and sufficiently simple and reliable to be followed, the agent should be instructed to collect the correct amount, or refund the overcharge if he has already collected the incorrect amount, and the *agent*, if necessary, should seek relief by making claim on the freight claim agent of his road, or the fast freight line office, as the case may require. This will not, of course, reduce the number of through claims *to be handled*, but it will reduce the number of claims presented by the patrons of the railroads, a very important consideration.

Though freight tariffs are, however, not always sufficiently simple and reliable to pursue the course indicated with safety, particularly when freight comes from a great distance, where the rates are arrived at by adding together the figures of two separate systems, and the tariff of one of the systems is not at hand, or, if at hand, is too vague to be followed without correspondence. In such cases the consignee should not expect the *delivering* railroad to settle his claim without the necessary investigation, for investigation frequently shows that there is really no overcharge, or, if there is, that it is not the fault of the delivering road. Often it is the road on which the freight was shipped, and such road must be consulted and its authority secured to settle the claim. This takes time, and the consignee should be patient and should not get the idea that the railroad which delivered him the freight has swindled him, and is doing all it can to avoid correcting the swindle, for it is, on the contrary, generally doing all it can to unravel the tangle with the view of seeing him righted. The public should appreciate the value of the system of through way-billing, which vastly assists in the rapid movement of freight, and it should also appreciate the difficulties attending the settlement of many of the claims resulting from such shipments, and the injustice of asking the delivering roads to settle, without proper investigation, claims for which said roads are in no manner to blame.

It is true that "a tariff is a bargain which a railroad is bound to live up to," particularly an inter-state tariff; but a bill of lading is not a tariff, and if a bill of lading covers inter-state business, it is not correct to say that "the delivering road should promptly settle all overcharges upon the basis of the rate named in the bill of lading," for, through clerical error, the rate inserted on the bill of lading may not agree with the tariff on file at the shipping point and with the Inter-state Commerce Commission, and the latter can compel the railroad to charge tariff rate, and will protect it in refusing to carry out the incorrect rate named on the bill of lading.

Were it not for the fact that there are some tricky shippers (as well as some tricky railroad officials), and were all men absolutely honest, the adjustment of freight claims would undoubtedly be greatly simplified. But not only will "a trader get the lowest possible rate of freight, and get it sometimes if he can by lying to one line about the rates quoted him by a competitor," but some traders will also represent that a package contains a certain kind of low class goods, when it really contains a different kind of higher class goods; then when the railroad charges according to the latter, the trader will blandly present a claim for "overcharge." And some shippers will sometimes receive packages by steamer damaged by water on the voyage, and will reship them by railroad to their customer in the West, and make the necessary deduction on the invoice, and the consignee, fully aware of the facts, will, after opening the package, call the delivering railroad agent to witness how the goods were damaged, "no doubt, on account of a leaky roof in the car in which the package was carried," and blandly present his little claim for "damage." Episodes of this kind being of frequent occurrence, is it surprising that railroads consider it proper to carefully investigate all claims? Will not all fair minded claimants admit that they are justified in doing so?

But, while claim agents are disposed to treat with fairness and all possible promptness the claims presented to them by consignees, or shippers, they do not always pursue that course when claims are referred to them by other railroads. This is an evil that demands correction, for it is the cause of nearly all the delay in the adjustment of claims of which the patrons of railroads have any right to complain. In the case of claims arising from shipments of through freight, notably claims for loss or damage which cannot clearly be located on any of the particular roads which carried the freight, there is frequently a deal of unnecessary correspondence, each road endeavoring to disclaim all liability so far as it is concerned; it is here that the claim agent gets in some very fine work by writing beautiful letters to convince the other fellows that they and not he should pay the claim. After months of this kind of correspondence, the claim is settled, after all, by being prorated between all the roads interested. This nonsense could all be avoided if all the roads would agree to business-like rules for the adjustment of joint claims; and the recently formed "Claim Agents' Association of the Eastern, Middle and Southern States," is certainly in the interest of that much needed reform, and should be commended by railroad patrons who have occasion to present freight claims.

In conclusion, it may not be amiss to state that there are a few railroads which will never participate in the payment of any freight claims if they can by any possible technicality avoid doing so. When they find that they cannot consistently refuse to participate, they will defer consent to the last possible moment. Several employ what some one has termed "professional" claim agents, whose duty it is to "kill" as many claims as they can; but the number of such roads is fortunately very small.

ESHAVA.

## Railroads in China.

The periodical announcements that an American "syndicate" is hiring men for employment on Chinese railroads have not been made very recently, but we are still called on for information by young men of an adventurous turn, who hope for employment or advancement by going to China. A subscriber in China, writing under date of May 14, tells us that it is quite certain that the government will not permit any concessions to be given, especially for railroads.

There are now under construction two short lines of 3 ft. 6 in. gauge in Formosa. These are regarded as of very doubtful utility except for military purposes. Other than these, the only line building is that of the China Railway Co.

The first railroad built in China is that at Kaiping, built in 1880 by the Chinese Engineering & Mining Co. to facilitate working the coal mines operated by that company. This line is described at some length in Gen. J. H. Wilson's capital little book, "China, Travels and Investigations in the Middle Kingdom, etc." It is 7 miles long, 4 ft. 8½ in. gauge, 30-lb. rails, and is described by General Wilson as "a beautiful model of what a light railroad should be." In reviewing this book last August we described briefly the first locomotive used on this road. It was built at Kaiping by Mr. C. W. Kinder, lately Chief Engineer of the Kaiping Railway, and now Chief Engineer of the China Railway Co. He had to build it surreptitiously of such odd material as he could pick up. Afterward two tank engines from Stephenson's, England, were taken out for the road.

From 1880 to 1886, nothing was done except surveying and reporting on scores of lines in North China. In 1886–7 the Chinese Engineering & Mining Co. sold their 7 miles of line to a new company, styled the Kaiping Railway Co., Limited, and this company built 21 miles more line to Lutai, on the Peletang River. This was opened in May, 1887, and has run very successfully ever since. In May, 1887, the viceroy got permission to push the line on to Taku and Tientsin, and surveys were started at once, but no foreign help being available, the work was not pushed until July, when rains and floods caused serious delays. The company's name was changed to the China Railway Co., as Kaiping was no longer the most important point to be considered. The line to Taku was laid by January, 1888, and is now open to traffic. Rails had been laid on the Tientsin extension to within 10 miles of that city when our correspondent wrote, but progress was arrested by six uncompleted bridges. It was expected, however, that by the end of June the entire line would be finished. The lengths of several sections of the line are as follows:

| | |
|---|---|
| Trephan to Lutai, 45-lb. rail | 28 miles. |
| Lutai to Taku, 60-lb. rail | 28½ miles. |
| Taku to Tientsin, 70-lb. rail | 30 miles. |
| Main line, total | 86½ miles. |
| Branches, etc., about ten miles more. | |

Sandberg's standard rail sections and angle fish-plates are used.

The line to Pekin may extend 70 miles next year, and the 70-lb. rail will be used, and high speeds run for mail service.

At present most trains are heavy mixed, as fares and freight are very low indeed. The average freight tariff is 1.1 Mexican cents per ton mile, the second class passenger tariff is .48 Mexican cent per mile, and first class passenger tariff is .72 Mexican cent per mile.

Some interesting information is given by the same writer concerning the equipment of the China Railway Co.'s line. The passenger cars are mostly of the American style, but with uncushioned seats. They are 50 ft. long, on 4-wheeled iron trucks. The frames are English steel channels; the wood-work is Chinese; the wheels and axles German. The wheels are wrought iron disks with 42 in. steel tires attached by Stroudly & Carlton's fastening. The disks are single plates, hydraulic stamped. Other car wheels are, some American cast iron chilled wheels 36 in. in diameter, and some English hydraulic forged spoke wheels with steel tires. Some of the axles are scrap and some of steel.

There is one locomotive by Grant, of Paterson, a double-ender, cylinders 15 in. × 20 in., drivers 46 in., six-coupled, and pony truck fore and aft. There are six English locomotives of the same type, with plate frames. Four of these have steel fire-boxes and two have copper fire-boxes. These fire boxes are experimental with the company. There are also for the Taku-Tientsin section four American type engines, built by Dübs, of Glasgow. These have plate frames, but are of the American style in all other particulars. They have 17 × 24 in. cylinders and 6 ft. drivers.

The rolling stock is: one state car, 50 ft.; 17 passenger cars, 50 ft.; four cabooses, 20 ft., four wheel; 95 coal wagons, 10 tons capacity, four wheels; 60 stone cars, 16 tons capacity, eight wheels; 25 freight cars, 20 tons capacity, eight wheels; 72 muck cars, six tons capacity, four wheels.

The cross ties are all from Japan, and cost 90 Mexican cents each, soft and hard wood. There are also 200 steel sleepers from England for trial. The rails are from Krupp, and English makers, and cost $40, gold, per ton delivered.

By reason of difference in ocean freights, all material from the United States costs more than from Europe. The English locomotives were cheaper than the American, and English steel-tired wheels cost less than chilled wheels from the United States. Fifty 4-wheeled M. C. B. standard freight trucks with 36-in. wheels cost about 37 per cent. more than they can be got for from Europe. In fact, at present, the United States cannot compete with English and German firms. Many tools are got from the United States, as well as engine oil and other supplies, and all clocks.

The coal is from the Kaiping colliery, which now yields 1,250 tons a day.

Our correspondent says: "We are closely following the

best United States and English railroad work in order to prevent China sharing the blunders of our past."

He is afraid to trust the cheap chilled wheels lately made, but says, "I have a great affection for good ones, and, although an English engineer, I think that in the United States I should stick up for their continued use, provided they are of good quality and perfect form.

"Your United States axle-boxes are very bad, and we make our own to fit the trucks we buy from the United States. We use the Beuther for all except your trucks. For the latter we simply make a good, tight box, with a spring pad and wicks (instead of the packing, waste and grease, plus oil). The casting is carried up around the top of the dust shield, and a cover is fixed over it by running in lead. These are *tight* and *cheap*.

"We use the Janney coupler, placed in centre of sill, 3 ft. 6 in. from rail. We find the pins jump out, and have been compelled to use a simple lock arrangement to prevent it. The coupler stands the buffing all right. No dead-blocks are in use yet. Freight trains run from 18 to 22 miles per hour, carrying up to 600 tons cargo. The line is very level and straight.

"Cofrode, of Pittsburgh, built one bridge for us, 120 ft span, and Arrol, of Glasgow, another of the same type. The United States bridge was much dearer, of superior metal; the English more clumsy, difficult to erect, but very well built and strong. United States type can be more cheaply built in England if a little extra weight for inferior iron is no drawback. Arrol's price was 30 per cent. lower, delivered in China. All the other bridges are English. The longest is 780 ft., across the Peletang Ho, plate girders, 50 ft. spans chiefly."

A staff of 13 Englishmen is employed on this road in various grades. Mr. C. W. Kinder is Engineer in Chief and Superintendent, and Mr. G. D. Churchward is Locomotive Superintendent. The Managing Director is Ng. Choy, and Traffic Manager, Mr. R. W. Lemmon.

The winters are severe, the climate being much like that of Canada, but with little snow. The people give no serious trouble, although the higher classes interfere with business, and cause delays. It is thought that the company will be allowed to go ahead slowly, but the political difficulties are said to be immense. As in all oriental countries, there is much jealousy and intrigue, not only against foreigners, but amongst the native officials themselves; and behind all is the more or less intelligent and conscious opposition of the upper classes to a change which will bring the lower classes forward and which they realize will eventually destroy official prestige and privileges. It is only the fear of invasion which makes any railroad progress possible.

## Iron Bridges on the Boston & Albany.

The strengthening of the bridges on the Boston & Albany is being carried on quite extensively this season. The necessity of this work is apparent on many of the older bridges, not because of any dangerous weakness of the structures, but for the reason that if not strengthened they would hardly be able to stand the increasing traffic of the road more than a few years longer. The bridges show no structural defects, the workmanship being of the highest order. The increase in weights of engines and loaded cars, which has been so great for the past few years, with the probability of still heavier loads, necessitates a corresponding increase in the strength of the bridges.

These bridges were originally designed to carry a live load of 3,000 lbs. per running foot for each track, and in many cases for an additional load due to an engine weight of 90,000 lbs. on three pairs of drivers with a wheel base of 14 ft. The standard of loading for all bridges now under construction is as follows: live load, 4,000 lbs. per running foot of track preceded by a heavy consolidation engine, a diagram of which is shown in fig. 1. This style of engine is now used between Albany and Pittsfield, and it is expected that it will soon be used on other portions of the road.

The bridges have all been carefully figured during the past few months and strains obtained under the system of loading last described. In several cases tests have been made by running the heavy engines over the bridges and measurements obtained of the deflections.

As all of the bridges built previous to 1887 were designed under practically the same system of loading as the older ones, it might seem probable that all would need strengthening. Such, however, is not the case. In the older bridges just enough material was put into each member to make up the necessary area; but all those built within the past eight years have been more generously dealt with, more iron being put in than was absolutely necessary to satisfy the figures. With a very few exceptions, no members of these later bridges show a strain exceeding 9,000 lbs. per sq. in. The most simple style of bridge, the rolled beam, has not been omitted in this investigation, and extra beams have been added where needed.

The plate girder bridges will be repaired on the same principle. They are made with one girder for each rail, the girders being 6 ft. apart. It is proposed to spread the girders to 7 ft. 6 in. on centres, and place a new girder midway between. This arrangement will bring one-third instead of one-half the load on each girder.

The strengthening of the truss bridges involves the greatest amount of labor. Floor beams, chords and trusses will have additional plates and angle irons, and in some cases new floor beams and track stringers will entirely replace the old floor system.

A deck bridge at Palmer has just been repaired with the addition of necessary material in the trusses and an important change in the floor. As originally constructed, the wooden ties

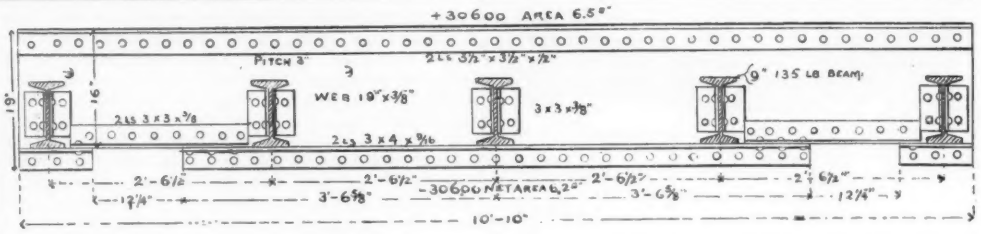



Fig. 3.

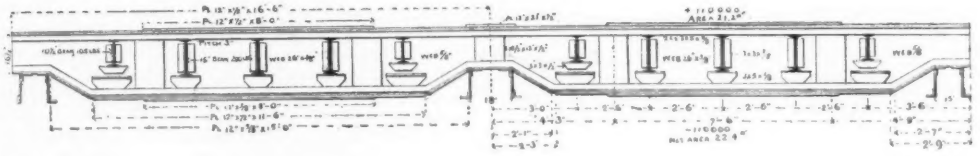


Fig 4

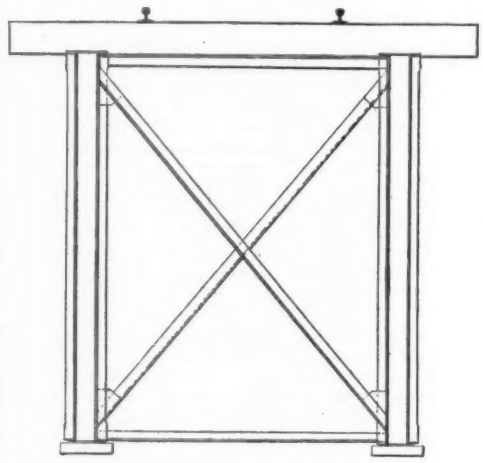


Fig. 2.

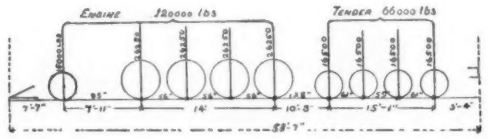



Fig. 1.

## STRENGTHENING IRON BRIDGES ON THE BOSTON & ALBANY.

constituted the floor system (fig. 2), the trusses being 8 ft. apart. This makes a very unsatisfactory flooring. The bridge is now equipped with a suitable system of floor beams and track stringers, as shown in fig. 3. There is one other bridge which will be treated in the same manner. Additional vertical bracing has been built between the trusses of the older deck bridges.

The bridge across the Connecticut River is now undergoing a thorough overhauling, which will occupy the time of a large force of men for some four months. This is a through truss bridge, 1,260 ft. in length, divided in seven equal spans. The trusses are being strengthened and the floor system entirely renewed. The present floor-beams are of the same style as shown in fig. 3, being, however, but 16½ in. in depth. There are four stringers under each track; these are 10½ in. in depth, weighing 105 lbs. per yard. Fig. 4 shows the new floor system. There will be 196 of these beams and 630 new 15-in. track stringers. Two of the present 10½-in. stringers will be used in each panel as shown. All the larger span bridges on the main line of this road are riveted lattice.

The repairs and improvements have thus far been made by R. F. Hawkins, of Springfield, who is also doing the work on the Connecticut River bridge. C. E. ALGER.

## Notes on Fuel and Combustion.

BY R. H. BUEL, C. E.

The subject of this discussion has been treated so extensively, that no one can hope to add much which is new. But a general synopsis of the most important principles and data, gathered from a variety of sources, may be interesting and useful to the reader.

### DEFINITIONS AND ILLUSTRATIONS.

*Combustion*, as the term is used in engineering, signifies the active chemical combination of some material, called a *combustible*, with oxygen, which is called a *supporter of combustion*, the union being so rapid that considerable heat is generated, accompanied by light. Combustible substances which are sufficiently cheap to be used in stoves and for heating and steam generation in industrial operations, are classified under the general name of *fuels*, and consist ordinarily of wood, charcoal, peat, sawdust, spent tan, coal and hydrocarbons in the liquid and gaseous state.

When a combustible substance is consumed in oxygen, its various constituents having formed gaseous compounds with the oxygen, and any incombustible materials which it contains having either been converted into vapor by the heat of combustion, if they are volatile, or left as solid or liquid refuse in the contrary case, it is commonly said that the combustible has been *burned*.

There are several other supporters of combustion, in addition to oxygen. For example, many metals can be burned in the vapors of chlorine, iodine, bromine and sulphur; and the latter substance is both a supporter of combustion and a combustible, burning in oxygen, but the engineer is only interested in the union of combustibles with oxygen, as already remarked. Generally speaking, the temperature of a combustible must be raised considerably above the normal point, before combustion will take place. There are a few organic compounds, such as zinc methyl, cacodyl and several antimonides of ethyl and methyl, which burn on being exposed to the air. Phosphorus inflames at about 140° Fahrenheit; sulphur, at 550°; charcoal, slightly below the temperature of red heat; and most other combustibles, at the temperature of red heat, or between 900° and 1000° Fahrenheit. These temperatures are greatly reduced, if the substances, instead of being burned in the air, are consumed in pure oxygen. A combustible, in burning, either simply glows, or emits flame, according to the temperature; *flame* being gaseous matter raised to the temperature of incandescence. The flame of a perfectly gaseous compound is almost colorless, and it is solid matter, usually carbon, in an incandescent state, which gives color or brightness to a flame. The gaseous substances resulting from burning a combustible, are called the *products of combustion or smoke*, and are colorless, if the combustion is complete. It frequently happens that some of the carbon in the combustible is not completely burned, and in this case the products of combustion are colored by the carbon, and form *black smoke*.

If a combustible substance is raised to the temperature necessary for combustion, the process of combustion will continue so long as fuel and air are supplied—unless, for some reason (such as a too rapid supply of fuel or air, or an interposition of cooling material), the heat carried off becomes greater than the heat of combustion, in which case the phenomenon of combustion will cease, or, in other words, the *fire* (which is the visible effect of combustion) will be extinguished. Within moderate limits, a plentiful supply of air is favorable to combustion; but an excessive supply of air will abstract so much heat from the fire as to extinguish it.

### THE NATURE OF FUEL.

The ordinary fuels are simply the results of long continued solar heat. Nearly every one is familiar with the process of charcoal burning, in which wood, by the application of moderate heat, is converted into charcoal; and it is well known that the charcoal so formed will give out, in burning, the heat which has been condensed within it, so to speak, during its formation. The charcoal-kiln is somewhat analogous to the immense kiln in which Nature, during long periods, has been storing up the sun's heat for the use of man. The vegetation, in the early period of the world's history, is supposed to have been more luxurious than at present, so that enormous trees, of a species now extinct, having been buried during the convulsions and changes to which the earth was subjected, kilns were formed, wherein these trees under the action of the sun's heat were converted first into charcoal, and finally into coal, this latter material being hard, soft or partially converted (into a lignite, for example,) according to the time and intensity of action. Figuratively speaking, when coal is burned petrified heat is utilized, and in this sense it may be said that the modern steam engine, in which the steam is generated by the combustion of coal, is the most complete realization of the solar engine yet produced.

The combustible constituents of all fuels in practical use are one or more of the following:

Carbon, either free or combined with hydrogen and oxygen.

Hydrogen, either free or combined with oxygen, forming water.

Sulphur.

The incombustible constituents are either volatile, such as nitrogen and oxygen, or solid refuse, such as earthy matter, chiefly silicates.

The constituents above named, with the exception of the solid refuse, are chemical elements, having the following chemical symbols:

| Substance. | Chemical symbol. |
|---|---|
| Carbon | C |
| Hydrogen | H |
| Sulphur | S |
| Nitrogen | N |
| Oxygen | O |

The chemical symbols are used to indicate parts by weight of the different substances, and a chemical compound is indicated by writing the symbols of the several components, connected by the sign of addition, adding numerical factors to such symbols as enter into the compound in multiple proportions. This will be illustrated by some examples.

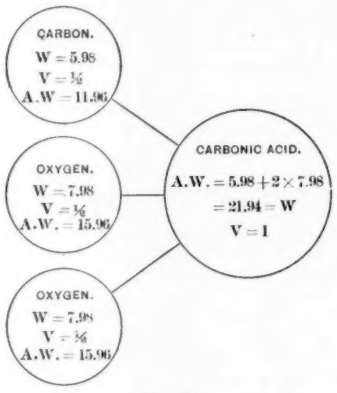



Fig. 1.

In the combustion of fuel, carbon unites with oxygen in two proportions, forming, according to the existing conditions:

Carbonic acid = C + 2 O; or
Carbonic oxide = C + O.

Carbon also unites with hydrogen in two proportions, forming:

Light carbureted hydrogen, or marsh gas = C + 2 H; or heavy carbureted hydrogen, or olefiant gas = 2 C + 2 H.

Hydrogen unites with oxygen in one proportion, forming water = H + O.

Sulphur unites with oxygen in one proportion, forming sulphurous acid = S + 2 O.

These chemical formulas are frequently expressed in a different manner, the chemical symbols being written without connecting signs, and the number of chemical equivalents in a compound being indicated by small figures at the bottom of the symbols, as shown below:

Carbonic acid = $C O_2$; carbonic oxide = C O; marsh gas = $C H_2$; olefiant gas = $C_2 H_2$; water = H O; sulphurous acid = $S O_2$.

### AIR.

The air of the atmosphere consists essentially of nitrogen and oxygen, not chemically combined, but forming a mechanical mixture. Air ordinarily contains, in addition, a certain amount of moisture, existing in the form of gaseous steam, the exact amount of moisture being a variable quantity.

The proportion of oxygen and nitrogen in atmospheric air has been determined by physicists, at various points of the earth's surface, and it has been found that this proportion is practically constant, being, in every hundred volumes, 79 volumes of nitrogen + 21 volumes of oxygen, which is expressed in chemical symbols by 2 N + O = $N_2$ O.

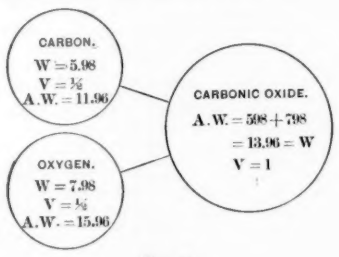



Fig. 2.

Atmospheric air, in the natural state, is rarely, if ever, absolutely free from moisture, perfectly dry air being obtainable, generally, only by chemical manipulation. The amount of moisture in the atmosphere depends upon the atmospheric conditions and the temperature. Atmospheric moisture is usually expressed as a certain percentage of complete saturation. At every temperature of air there is a definite amount of moisture (the amount increasing rapidly with increase of temperature) which will produce complete saturation, so that an increase of moisture beyond the amount required for saturation will be deposited either as dew or rain.

In ordinary practice, the oxygen required for the combustion of fuel is derived from atmospheric air; so that the nitrogen and moisture of the air must also be admitted to the fire, diluting the products of combustion and diminishing the useful heat realized from the combustion, by the amount of heat required to raise their temperature from the normal point to the temperature of the escaping smoke; the temperature of this smoke being measured at the point where the products of combustion cease to produce useful effect by their passage over heating surfaces or other heat-absorbers.

It must be evident, that if the amount of heat utilized in any particular case is to be measured, as well as the waste heat carried off in the smoke, it is important to determine the condition of the air supplied for combustion, or the quantity of moisture which it contains. This is usually done by observing the pressure of the air, and the indications of two thermometers, one of which is of the ordinary form, the other one having its bulb surrounded by a piece of moistened cloth. From these indications the moisture of the air can be determined, by the data given in meteorological tables. To illustrate, suppose that in a certain experiment, the following observations were made:

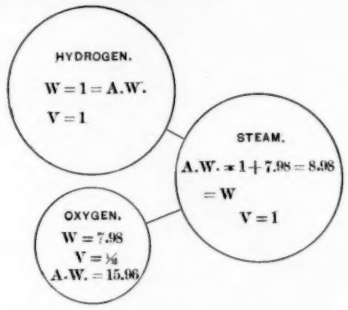



Fig. 3.

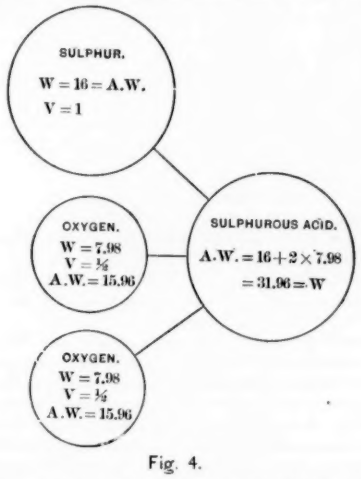



Fig. 4.

Atmospheric pressure, inches of mercury at 32° Fahrenheit = 30.

Temperature of the air, Fahrenheit, dry bulb thermometer = 110°.6; wet bulb thermometer = 95°.9.

Temperature of the escaping smoke, Fahrenheit, = 340°.

Cubic feet of air, at the temperature of 110°.6 Fahrenheit, supplied per pound of fuel burned = 325.

It is required to find the amount of heat carried off by this air in the escaping smoke.

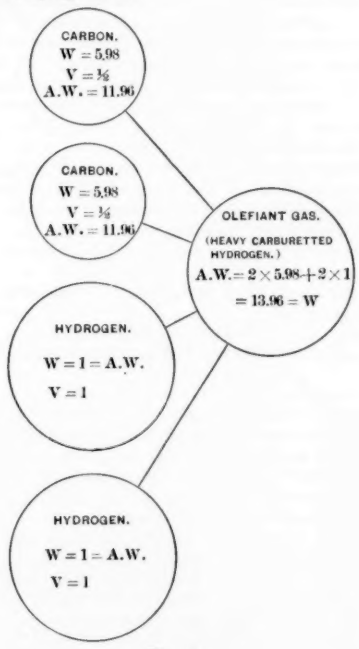



Fig. 5.

From a metrological table it is found, by a simple calculation, that the weights per cubic foot in pounds are as follows:

| | |
|---|---|
| Moisture in a cubic foot of atmospheric air | = .002157 |
| Dry air in a cubic foot of atmospheric air | = .066354 |
| Weight of a cubic foot of atmospheric air | = .068511 |

Specific heat of the mixture = .245.

Weight of moisture required to saturate a cubic foot of air = .003798 lb.

Actual weight of moisture in a cubic foot of air = .002157 lb.

Percentage of moisture in the air = 56.8.

Pounds of air supplied per pound of fuel,

325 × .068511 = 22.3.

Hence the heat carried off by the air in the smoke per pound of fuel burned is (340 — 110.6) × 22.3 × .245 = 1253.3 British thermal units.

### THE CHEMISTRY OF COMBUSTION.

Whenever two or more chemical elements combine chemically heat is produced, and the resulting chemical compound usually has a smaller volume than would be represented by the sum of the volumes of the several elements. Whenever a chemical compound is separated into its constituents, work is performed, and heat disappears.

The combustibles in ordinary use are compound bodies, so that the operation of combustion is somewhat complex, heat being converted into work in decomposing the compound bodies, and heat being generated by the chemical union of these constituents with other elements. If the heat generated by chemical union is greater than the heat converted into work by the chemical decomposition of a fuel, the fuel is of practical value.

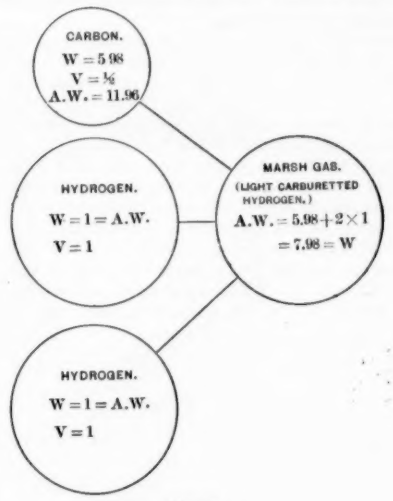



Fig. 6.

All chemical elements combine in certain definite measures, either by weight or volume. The weight and volume of hydrogen are ordinarily taken as units, and the weights of similar volumes of other elements in the gaseous state at the same temperature are called *chemical equivalents by weight*, or *atomic weights*, while the relative combining volumes of these elements, under the same conditions, are called *chemical equivalents by volume*, or *atomic volumes*. The values of the atomic weights and volumes of the different chemical elements have not been fixed with absolute precision, but the values given below for the elements found in combustibles and supporters of combustion are those given by good authority:

| Element. | Atomic weight. | Atomic volume. |
|---|---|---|
| Hydrogen | 1 | 1 |
| Oxygen | 15.96 | ½ |
| Nitrogen | 14.06 | 1 |
| Carbon | 11.96 | ½ |
| Sulphur | 16 | 1 |

The atomic weights and volumes of the compounds of these elements which make up the ordinary combustibles, supporters and products of combustion, are illustrated graphically in figs. 1 to 7. For example, in fig. 1, representing the formation of carbonic acid ($C O_2$), there are two atomic volumes of carbon, and one volume of oxygen, each of these volumes being ½ the combining volume of hydrogen, or 1½ atomic volumes in all, while the atomic volume of the carbonic acid, which is the result of the chemical union, is only one. In fact, it will be seen that in each figure the volume of the compound is always one, except in fig. 7, where the elements are merely mixed together, so that the volume of the compound is the sum of the volumes of the elements.

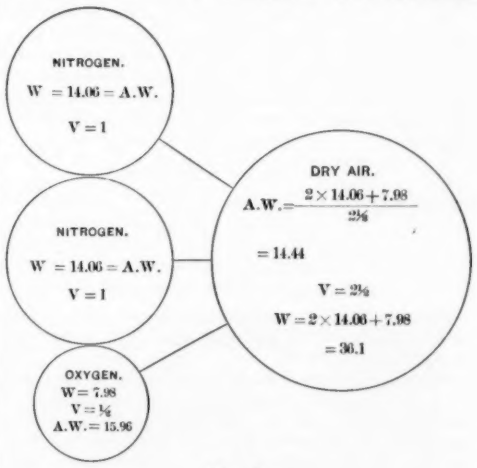



Fig. 7.

These figures should be carefully examined by the reader, for they contain the most important data of the chemical theory of combustion. In each figure the letters "A W" signify "atomic weight," or the relative weight of any volume of the element or compound in a gaseous state, compared with the weight of the same volume of hydrogen, in a gaseous state, and at the same temperature; the letter "W" signifies

"combining weight," or the relative weight of the combining volume, under the conditions above stated, compared with the weight of the combining volume of hydrogen, under the same conditions; and the letter "V" signifies "atomic volume," or the relative combining volume, in a gaseous state, compared with the combining volume of hydrogen, in a gaseous state and at the same temperature. It will be observed that the atomic volume is equal to the combining volume for all of the elements except carbon and oxygen, and for all of the compounds, except the mechanical mixture, air.

The absolute weights and volumes of these elements and compounds, together with their specific heats, are much used in engineering calculations.

These data are presented in the accompanying table, having been selected as carefully as possible from a number of conflicting values. In regard to the column headed "specific heat," it should be remarked that the specific heats of most bodies are not constant at all temperatures, so that the figures given represent average values.

The use of the table may be illustrated by an example:

What is the weight of 100 cu. ft. of carbonic acid at the temperature of 350° Fahrenheit, and what is the volume of 10 pounds of this gas at the same temperature?

The increase of temperature above 32° is 350°—32°=318°, so that the volume of a pound is increased from 8.151 cu. ft. to $8.151 + 318 \times .002056 \times 8.151 = 13.48$ cu. ft., and the weight of 100 cu. ft. at the given temperature, is $\frac{100}{13.48} = 7.42$ pounds.

Since the volume of 1 pound of this gas is 13.48 the weight of 10 cu. ft. is $\frac{10}{13.48} = .742$ lb.

*Data Relating to Combustibles, Supporters and Products of Combustion.*

| Element or compound. (In a gaseous state.) | Chemical symbol or formula | Atomic volume (H = 1.) | Atomic weight. (H = 1.) | Weight and volume, at atmospheric pressure, and temperature of 32° Fahrenheit. Weight per cu. ft. Lb. | Volume per lb. Cu. ft. | Expansion of volume, at constant pressure, for increase of temperature of 1° Fahr. | Mean specific heat, at constant pressure. (Water = 1.). |
|---|---|---|---|---|---|---|---|
| Carbon | C | ½ | 11.96 | .066880 | 14.952 | .002028 | .201 |
| Hydrogen | H | 1 | 1 | .005592 | 178.83 | .002033 | 3.409 |
| Sulphur | S | 1 | 16 | .089472 | 11.177 | .002117 | .108 |
| Nitrogen | N | 1 | 14.06 | .078624 | 12.719 | .002039 | .244 |
| Oxygen | O | ½ | 15.94 | .089248 | 11.205 | .002039 | .218 |
| Carbonic acid | $CO_2$ | 1 | 31.94 | .12269 | 8 151 | .002056 | .216 |
| Carbonic oxid | CO | 1 | 13.96 | .078064 | 12.81 | .002039 | .245 |
| Water vapor | HO | 1 | 8.98 | .050213 | 19.915 | .002028 | .475 |
| Sulphurous acid | $SO_2$ | 1 | 31.96 | .17872 | 5.595 | .002139 | .154 |
| Olefiant gas | $C_2H_2$ | 1 | 13.96 | .078064 | 12.81 | .002083 | .404 |
| Marsh gas | $CH_2$ | 1 | 7.98 | .044624 | 22.4 9 | .002083 | .593 |
| Dry air | $N_2O$ | 2½ | 14.44 | .080728 | 12.387 | .002028 | .238 |

The weights and volumes in the foregoing table are for average atmospheric pressure, corresponding to the barometric reading (reduced to 32° Fahrenheit) of 29.9218 in. The actual atmospheric pressure is rarely at the average value, so that corrections must generally be applied to the figures in the table, if great accuracy is desired. These corrections can be made by assuming that the pressure and volume of each gas in the table are in inverse ratio. Suppose, for example, that the barometric reading (reduced to 32°) at the time of an observation, was 29.625 in., and it is required to find the weight of 100 cu. ft. of oxygen at the temperature of 432° Fahrenheit.

The increase of temperature is 432° — 32° = 400°, and if the gas were at average atmospheric pressure its volume would be $11.205 + 11.205 \times 400 \times .002039 = 20.344$ cu. ft. But since the pressure of the air is only 29.625 in. of mercury, and the volume varies inversely as the pressure, the actual volume of 1 lb. of oxygen at the temperature of 432° is

$$\frac{29.9218}{29.625} \times 20.344 = 20.548 \text{ cu. ft.};$$

and the weight of 100 cu. ft. is

$$\frac{100}{20.548} = 4.87 \text{ lbs.}$$

## The Cook Refrigerator Car.

The accompanying engraving represents a form of refrigerator car recently introduced by Messrs. W. L. Cook & Co., of Omaha, Neb.

The special feature of the car is the use of wicking, which by capillary attraction absorbs the condensed moisture inside the car and delivers it into two longitudinal passages, running the length of the car and open to the external atmosphere. The construction of the car is clearly shown in the accompanying engraving:

*A* represents the ice-box full of ice.

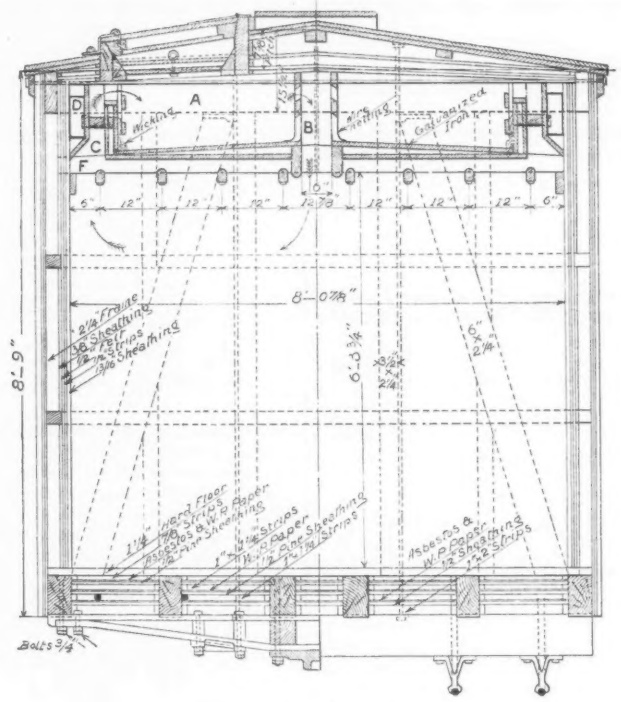
*B* the cold air duct from the ice-box into the body of the car.

*C* the warm air flue leading from the body of the car back into the ice chamber.

*D* the capillary tubes running entirely through the car, with an opening at each end admitting a current of air when the car is in motion, producing an evaporation of the water carried by the wicking into this tube from the gutter in the ice-box.

This wicking acts on the same principle as the wicking in a lamp, and is used for the purpose of saving ice. The heat and gases from the body of the car seek their level through the warm air flues passing into the ice chamber, and are there cooled, and the condensed moisture is taken up and thrown out of the car by the capillary tube.

*F* is a carline extending entirely across the car for supporting the ice chamber, hanging meats, etc. The sides of the car are lined with four courses of heavy carpet felt paper, one course of half-inch and one of three-quarter-inch hair felt, and outside of all, but under the first course of boards on the outside of the car, is a lining of asbestos.




The Cook Refrigerator Car

There are eight capillaries on each side of the car, and more can be used if necessary.

Several trials have been made with this car, and, according to the report of the Anglo-American Provision Co., a Cook refrigerator car made the run from Omaha to New York with 6,000 lbs. of ice in 7 days, which is a saving of 8,000 lbs., or 4 tons, over the quantity used by another style of car, amounting to a saving of $6 per car, or $120 per day on a 20-car shipment. As this was the first car built under this patent, the makers hope to make further improvements in construction, and make still greater savings in the quantity of ice used.

Mr. Cook states that the following tests have been made with this car:

First test in car-house at Union Pacific shops at Omaha: Test commenced March 28, 1887, at 2 o'clock, and lasted 7 days; 7,000 lbs. of ice were put in box; at end of test only 4,000 lbs. had been used. Average temperature, day and night, 96.3 degrees Fahrenheit.

Second test by Anglo-American Provision Co.: Car loaded one-half with lard hot from tanks and half with chilled meats. Car iced May 11, 1887; 6,000 lbs. used. Left yards of company at South Omaha, May 12; arrived in New York at 9:15 p. m. May 19, and required no additional ice during transit. Contents in perfect condition. Temperature inside car, 50 degrees, and a small quantity of ice remaining.

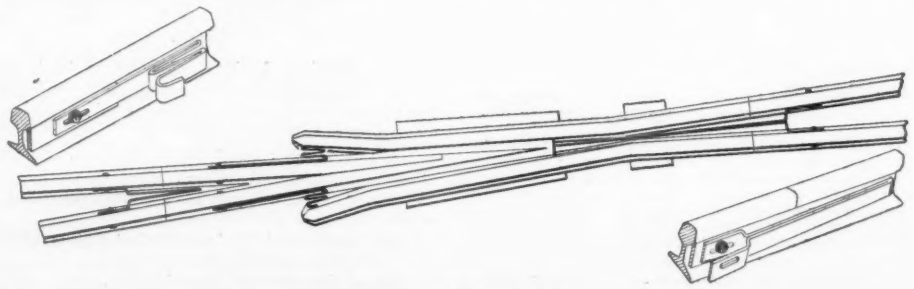
Third test by Anglo-American Provision Co.—Car iced July 18, 4,000 lbs. used. Left South Omaha July 19, outside temperature 90 degrees, and arrived in Chicago July 21; outside temperature 80 and inside 44 degrees. Meat in good condition and 800 lbs. ice remaining.

It is claimed that these cars cost no more than ordinary refrigerator cars and that a perfectly dry temperature varying from 34 deg. to 44 deg. can be obtained, and that consequently the contents, either meat or vegetables, are perfectly preserved.

## Nevens' Foot Guard.

The form of foot guard shown in the illustration herewith is in use in many frogs on the Maine Central, where it is said to have given good satisfaction for many months. The design and construction are clearly apparent in the cuts, and no description is necessary. Bent plates are bolted to the webs of the rails so as to fill the dangerous spaces, and the objections to the cheap wooden guards used on some roads are largely or wholly obviated. A wooden guard, if it becomes loosened, is quite apt to be broken or thrown away, so that unless the section master has spare pieces and gives careful attention to the fixture its maintenance is unsatisfactory. The iron plates are not likely to get out of shape, and even if they are, can be easily reshaped. Foot guards probably do not prevent a great number of accidents, but their usefulness is well enough attested to warrant trainmen in demanding that they be carefully kept in repair when once adopted.

This foot guard was designed and, we believe, is patented by Mr. George Nevens, of Brunswick, Me., Division Roadmaster on the Maine Central.



NEVENS' FOOT GUARD.

## Train Accidents in Great Britain.

The Board of Trade report of accidents and casualties for the first three months of this year has been issued. Like the annual volume from which we published extracts a few weeks ago, it contains numerous suggestive exhibits which can be advantageously considered by American railroad men.

The first important special report concerns a slight collision which occurred at Coborn Road station on the Great Eastern Railway during the exceptionally dense fog of Jan. 17. A track laborer, who was appointed, as is customary in fogs, to stand by a semaphore signal and put on torpedoes when the signal was moved to danger, made the mistake (which, as our readers will recall, has been made before) of thinking a semaphore was pulled down when really it was horizontal. It seems hardly credible to persons unacquainted with London fogs that a signal 30 ft. high cannot be seen by a man on the ground within a few feet of it, but such is the case. In this instance the trackman told the conductor and engineman by word of mouth, and they are blamed for not having verified his statement, as he was not appointed for this particular signal, but gave this mis-information as a favor. It appears that signals are so numerous on the busy sections of road that men cannot be afforded for all of them, as will be seen from the following:

As it is almost impossible in suburban districts to provide fog signalmen, especially in a fog of long duration, at all signals, it becomes a question whether to omit them at the home signals or starting signals. The starting signal as giving admission to the next block section would appear at first sight to be the more important signal; but, on the other hand, in case of short block sections, should a driver miss seeing the home signal and only be warned at the starting signal, he might run far enough into the next block section to come into collision with a train already in it; whereas, if he is warned at the home signal, he has time to pull up before reaching the starting signal; and a train standing at the starting signal would be protected by the fog signals at the home signal in the case of a second train being by some mistake improperly allowed to enter a section before the first train has cleared it. On the whole, therefore, it may probably be considered better to place fog-signalmen at the home rather than at the starting signals if men cannot be afforded at both. * * * This collision again points to the great advantage that would arise from the adoption of a trustworthy mechanical audible signal; and I believe, as I have before stated * * * such a signal could be obtained.

Gen. Hutchinson congratulates the servants of all the roads

on the great care they successfully exercised during the remarkable fog, no other accident having occurred.

At Felstead two cars of horses got away while being switched, and ran down on the main track some distance, where they were run into by an incoming passenger train. Gen. Hutchinson says:

No blame is to be attached to signalman Heard, though I think he is not a man of resource, or it would have struck him to endeavor to warn the driver of the passenger train by a rapid movement of the distant signal arm.

At St. Dunstans, on the Great Northern, the engineer of a passenger train, was oiling his engine when the signal to go was given by the guard; the fireman started the engine without looking at the semaphore, and there was a slight collision. The signal the fireman neglected was on the left-hand side; there was another further along, which he did look at, probably under the impression that that was the first one he had to do with. It was claimed that the signal on the left ought to be on the right, but Major Marindin decides that it should remain where it is.

At Yatton, on the Great Western, the engineer of a short passenger train ran into some cars at the end of a spur track, knocking down the stonewall of the station building. Col. Rich says he was guilty of "excessive carelessness." He had a powerful engine and a good train brake. The track was slippery and he mentioned that fact as an excuse, but this "only aggravates his conduct," says the inspector.

At Hapton on the Lancashire & Yorkshire a freight was run into by a following passenger train in this wise: The freight pulled 1,100 ft. or more beyond the block signal station to back into a siding. A bell signal was used to communicate between the switch and the cabin; but in this case, although it was foggy, the cabin man turned the switch for the freight to back in before the freight conductor had asked him (by bell) to do so; then, when he *was* asked (by two taps of the bell) he mistook the signal for three taps—which means that the train is in the turnout—and thereupon turned the switch back on the main line. The freight, meanwhile, had backed, but not far enough to reach the switch. As soon as the signalman had reset the switch, he lowered the starting signal (giving the right to go to the next station) for the express train following; the freight men saw this, the signal being near them, and understood it to mean that *they* could proceed on their journey; they did so, and were soon run into. A freight house man was sent by the signalman to assist the freight crew in backing off; he went, but took no lantern, although it was dark (6.30 p. m.). If he had had a lantern he could have stopped the express. He is censured for this, and the signalman is censured for not strictly following the bell code. All hands are blamed for so readily believing that the signalman had suddenly changed his mind and concluded to allow the freight to go on ahead of the passenger train. The station master is censured for allowing laxity in the use of the bell code.

A through train from Scotland over the London & Northwestern acquired so much momentum in its long journey that it ran into the stop block on its arrival at London. The make up of this train is described as follows:

"Engine and tender, fitted with a steam brake, three trucks of fish, a brake-van, a composite, a saloon, one carriage truck, two horse boxes, a brake-van with a guard, another saloon, two composites, a third-class carriage and another brake-van, in which the conductor was traveling."

It had a *conductor*, the first official of that name we have seen mentioned. Colonel Rich says the guard and conductor, if they had been on the alert, might have assisted in stopping the train.

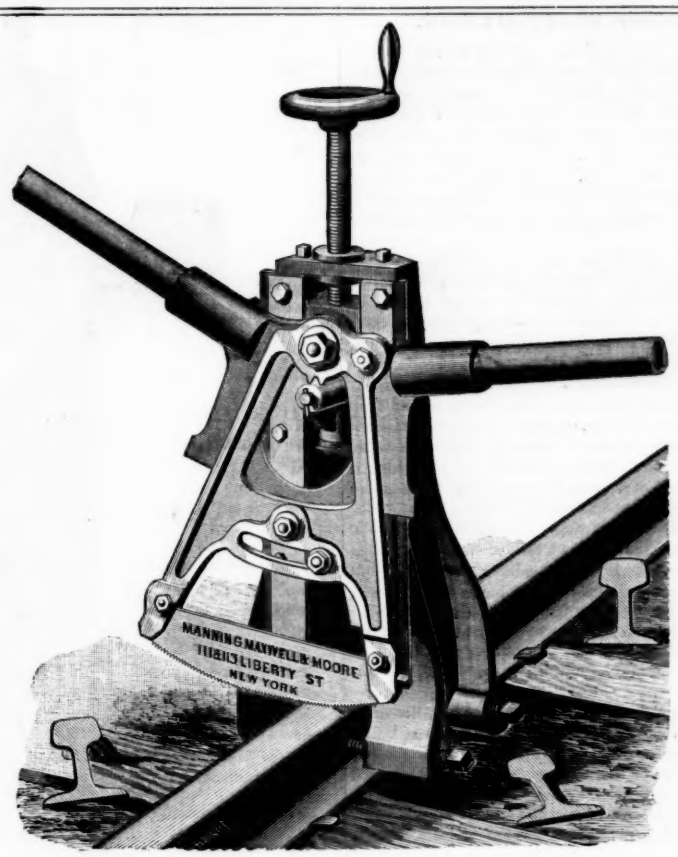
A crossing collision on the Metropolitan railway between a Midland and a great Northern passenger train turned out to be slight, but if it had occurred three seconds later would have been terrible. Major Marindin therefore makes elaborate recommendations. In the first place the home and distant signals are disks and precisely alike. Moreover they are in a tunnel, and the runner, from smoke or other reason, failing to see the distant signal, took the home signal for the distant and did not stop. But it is recommended further that short block sections be established on all the lines leading to such a busy crossing, and that no train be allowed to enter the last block before reaching the crossing, at the same time with a conflicting train. In other words, a home and a distant signal are not protection enough; there should be two home signals, as it were. One of the lines approaches this crossing on a steep down-grade, 91 ft. per mile.

Perhaps the most curious accident in the list was a rear collision near Portland road, on the Metropolitan, where all the most approved safeguards were in use. The signalman cannot give a clear signal to a train until his signal is unlocked by the signalman in advance, and the latter cannot do this until the previous train has passed him and operated a track instrument. But in this case the apparatus failed. A faulty ground wire caused an electric current to close an electro-magnet which should have been left open. The rear one of the colliding trains having waited some time for a clear signal, the signalman forgot, or began to doubt, whether he had received "line clear" from the next station in advance. If he had not had the electric locking he would in such a case have asked by wire to make sure; but looking at the electric indicator and seeing that that showed that he *had* received line clear, he allowed the train to start. The collision occurred in a tunnel where the tail light of the standing train could not be seen *at all*, owing to the smoke. The rear brakeman is not required to go back in cases of this kind. Major Marindin does not go into the particulars of the electric apparatus, leaving that to the electricians, but it appears clear that a better and safer arrangement of the circuits can be devised. That Englishmen and Americans have certain traits in common is shown by the statement that in this accident, although only 16 passengers complained of injury at the time, *forty-nine* had complained within a week after.

At New Cross, on the Southeastern Railway, a signalman pulled down the semaphore to let a passenger train come *to* his station, and at the same time, through thoughtlessness, also pulled down the starting signal which allowed the train to *leave* his station. He should not have done this, as the preceding train, a freight, had not cleared the block. (There was an electric indicator in his cabin, showing him this fact, and Gen. Hutchinson criticises the road for having this indicator in the end of the cabin, instead of on a shelf directly in front of the operator.) The man would quite likely have discovered his error before the train had left, but he just then went out, on a call of nature, leaving his boy assistant in charge. The latter allowed the train to proceed. The freight train ahead was detained at the next block, and just as the passenger train came in sight (on a curve) the home signal was being lowered for the freight to start. The passenger runner naturally assumed that the clearing of this signal was for himself (it was night, and he saw the light change from red to green) and so he supposed that the freight, of which he plainly saw the tail lights, was on the main line of another road, which ran parallel at that place. The collision would have been mitigated if not entirely prevented, says Gen. Hutchinson, if the whole of the vehicles in the passenger train, instead of only one-third of them, had been equipped with a continuous brake.

## Smith's Portable Rail Saw.

The illustration herewith shows the Smith rail saw in its perfected form. A machine was made by Mr. Smith early in 1885 with which he cut a 60-lb. rail in 35 minutes. As improved and now put on the market, it is said to be capable of cutting a 70-lb. rail in from 10 to 12 minutes. A letter from Mr. M. H. Dooly, Roadmaster of the Western & Atlantic, states that at a trial of a new machine he cut a 56-lb. steel rail in 11 minutes. It will cut off a section as thin as ⅛ in., leaving the end of the rail smooth and true. Other officers who have used the saw speak well of it.




SMITH'S PORTABLE RAIL SAW.

The feed is automatic. The blade is carried on pins in the frame, and is made rigid by the straining nut shown in the engraving.

This apparatus is the invention of Mr. E. C. Smith, of Brooklyn, and Messrs. Manning, Maxwell & Moore, of New York, are sole agents.

## Sand Brush for Locomotives.

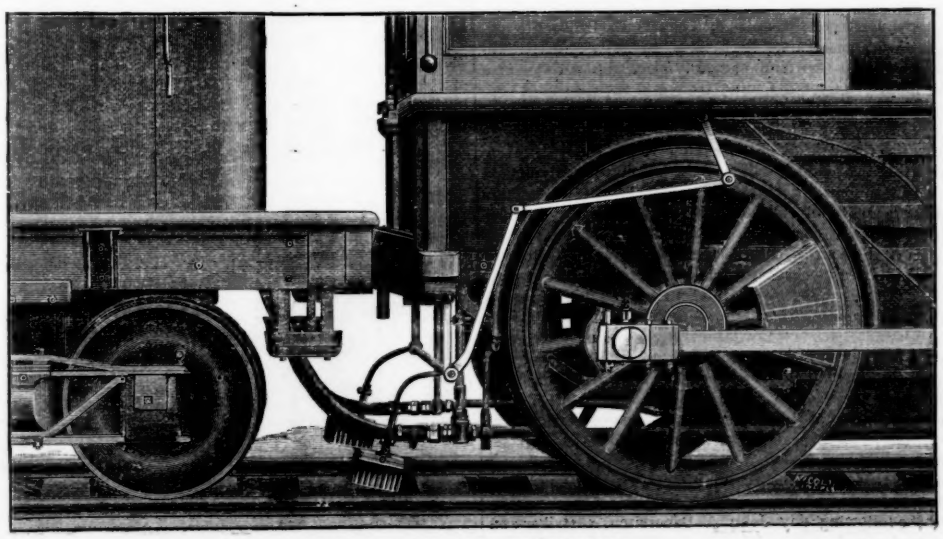
The accompanying engraving represents an apparatus for brushing sand off the rails. This apparatus was exhibited at the recent Master Car-Builders' and Master Mechanics' conventions, and is applied to the rail in the wake of the rear drivers.

This apparatus has been tried on the Cincinnati, Wabash & Michigan, and it is stated that the reduced resistance, owing to the absence of sand on the rails, enabled three extra cars to be hauled. The increased train resistance, due to sand on the rails, is doubtless appreciable, and though generally recognized, few experiments appear to have been made to ascertain the amount of this increased resistance.

It has, however, been found by careful experiments that washing dirty rails in the neighborhood of a large city appreciably reduces the resistance, and it is only fair to presume that the rough and gritty surface left by the crushed sand offers considerably more resistance than the smooth and polished surface of a steel rail.

The sand brush is made of steel about ⅝ in. × $\frac{1}{16}$ in., and can be raised clear of the rails by means of levers as shown in the accompanying illustration.

Any further information can be obtained of the inventor, Mr. Curtis McCoy, Wabash, Ind.



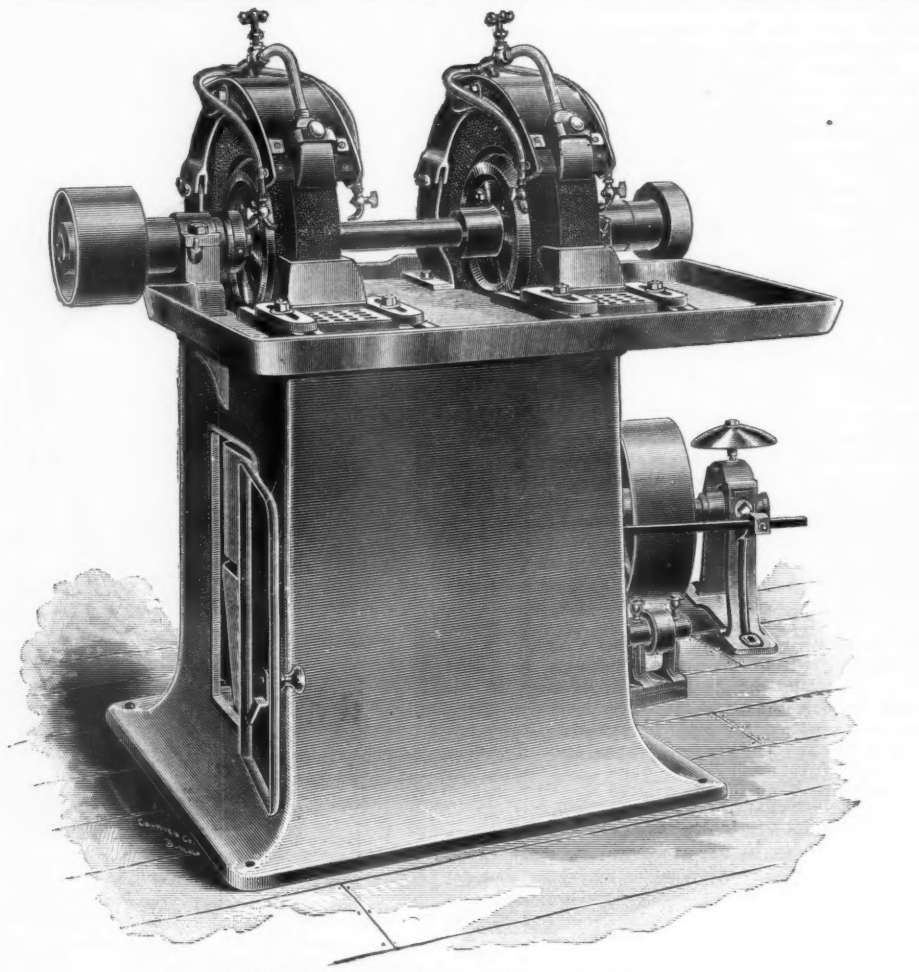
SAND BRUSH FOR LOCOMOTIVES.
BY CURTIS M'COY, *Wabash, Ind.*

### Improved Emery Wheel Tool Grinder.

The Springfield Glue & Emery Wheel Co., of Springfield, Mass., have just brought out an improved emery wheel tool grinder. It is a heavy machine, weighing about 1,800 lbs. It is claimed that the form of base renders it very stiff, and that when placed on a good foundation it is free from tremble and vibration. It has a 2-in. steel spindle and two emery wheels, each 20 × 3 in., with 10-in. hole, held by large collars. The large hole cheapens the wheels, as there is no hub or centre of wheel to throw away as in most emery wheel grinders.

The machine is generally furnished with emery wheels of two different grades, one coarse for rapidly removing the stock, and the other fine for finishing to a good edge. An iron tank, easily reached, is placed under the wheel to receive the water coming from it and catch the waste ground off, which settles to the bottom, and when sufficient collects the tank can be quickly drawn out and emptied. The water overflows from this tank comparatively clean into a second tank directly underneath, to which a centrifugal pump is attached and piped to carry the water to the wheels, where valves regulate the flow to the desired amount. As the pump is only connected to the lower tank, the upper tank is free from pipe connections and can be quickly emptied.

Water flows on the wheel through a small opening on the underside of the water distributor, which spreads it in a sheet across the face of the wheel. The machine stands 38 in. high from floor to centre of spindle and occupies a floor space of 33 in. × 34 in. The wheels are 16 in. apart. The general features are shown in the accompanying engraving.



IMPROVED EMERY WHEEL TOOL GRINDER.

*Made by the* SPRINGFIELD GLUE & EMERY WHEEL TOOL CO., *Springfield, Mass.*

### The Bailey Fusible Plug.

Fusible plugs, when they fulfill their object, and are fixed in a proper manner, melt when the water in a steam boiler becomes dangerously low, thus allowing the steam to put out or deaden the fire, and thereby preventing damage to the boiler, which would otherwise become, if not red hot, sufficiently so to cause a collapse of a very serious nature.

Some time ago a boiler flue collapsed at Bury, England, through a deficiency of water, and although a fusible plug of a primitive kind (a piece of lead driven into the crown) had been inserted, this had not prevented the accident. On examination it was found that the heat having melted the fusible metal of the plug caused a hole of a conical shape with only a diameter of $\frac{3}{16}$ of an inch for the steam to rush through. This small hole just allowed sufficient steam to pass to blacken the fire only immediately below it, and the remaining portion of the fire softened the crown sheet and caused a collapse attended with serious loss of life and property. This accident could not have occurred had a proper fusible plug been used, and many similar accidents have happened in this country.

Fusible plugs should be fixed in that portion of the boiler where the fire is fiercest. When the body of the plug is once fixed it does not require to be moved until it is considered advisable to replace it with a new plug. If at any time the fusible cap should melt, a new one can be inserted by unscrewing the lock-nut on the top of plug. Every time the boiler is cleaned or examined this cap should be removed for inspection, to be afterward refixed or replaced, as then decided.

Figs. 1 and 2 are fac-similes of two old style plugs, only partially fused, although the water had entirely left the crown sheet of the boilers. The chemical action of the water had changed the fusing point of the soft metal. It will be seen that with the Bailey plug, shown in fig. 3, the water is prevented from coming in contact with the soft metal by the use of the patent copper cap, so that its fusing point is maintained. It is also claimed that if the water should become low enough to permit the fire to fuse the cap, there will be sufficient water over the crown sheet or back connection, whichever might be the highest point, where the plug would be placed, to save the plate.

The Bailey plug has been largely used both in this country and in England. Any further information may be obtained of Geo. Van Wagenen, sole licensee and manufacturer for United States, West street, New York.

### Arrests of Engineers at Chicago.

On the afternoon of July 5, Thomas B. Broderick and J. A. Bowles, members of the Brotherhood of Locomotive Engineers, and another man named Wilson, were arrested on a Chicago, Burlington & Quincy train and imprisoned at Chicago, charged with conspiring to destroy the railroad company's property. A package containing four dynamite cartridges was found in their possession when arrested. It is stated that the road has had a force of detectives engaged for a long time in watching the movements of the strikers and that positive information was received that a day had been set for a concerted attack upon the company's property. Besides a definite plan to blow up trains by means of dynamite cartridges, the plot included the possibility of an attack upon the magnificient office building at Chicago. In Broderick's pocket were found several small dynamite fulminating caps. Bowles was engineer on the Atchison, Topeka & Santa Fe till March, when he was discharged. During the strike, he went to work for the Burlington road, but was persuaded to leave by the brotherhood men. Broderick was in the Burlington road's employ as late as April, but recently has had much to do with the strikers. Chairman Hoge visited the three prisoners in jail, and promised to look into their cases, but expressed no sympathy with them.

On the following day John A Bauereisen, a striker and chief engineer of Division 32 of the brotherhood at Aurora, was arrested and held in bonds of $5,000. Broderick, when arrested, threw a letter out of the car window; this letter was written by Bauereisen, it is alleged, and is said to show that he was in the plot. It is said that he brought the four dynamite cartridges to the train from the brotherhood headquarters in Aurora and gave them to the men in whose possession they were found. Five attempts, it is charged, have been made to wreck trains by the use of dynamite, two near Aurora, some weeks ago, and the others near Creston, Ia.

As a passenger train on the Burlington road was leaving Chicago Friday evening, July 6, a stone was thrown through the cab window of the engine, narrowly missing the engineer, and at Riverside, and again at Naperville, the engine was bombarded. At the former place a perfect storm of stones was thrown, battering the side of the engine and breaking glass. At Naperville the fireman was struck on the head with a flying missile, inflicting a slight wound.

On Wednesday evening (July 11), a Burlington switch engine was mobbed in the C., M. & St. P. yard and the engineer and fireman seriously injured. The engine was uncoupled and tried to escape, but was derailed by one of the mob who misplaced a switch. Links and pins were thrown by the score, and the cab and headlight were demolished. The police arrived too late to capture any of the assailants.

Press dispatches say that General Manager Stone issued a statement to the effect that the company about May 15 learned that there was a plot, and that Bowles, who is now in jail, was about to leave Chicago with a package of dynamite. He did so, taking the package from Room 34 of the Grand Pacific Hotel, the headquarters of the Grievance Committee of the strikers and occupied by Chairman Hoge. Then Mr. Stone relates the attempts to wreck trains near Aurora, one on May 29, the other on June 15. Remnants of the paper cartridge cases were found in both cases, and on the paper were the same manufacturer's marks as were on the cartridges captured with Bowles, Broderick and Wilson. After that Bowles went to Noblesville, where he was supplied with funds by a draft from Bauereisen. Broderick was at this time at Creston, Iowa, in consultation with brotherhood officials. He repeatedly asked Bauereisen to send Bowles "and his goods," and to Creston Bowles went, delivering to Broderick a supply of dynamite and caps. After Bowles left Creston the three explosions took place near the town. Meanwhile Broderick and Bowles had been supplied with letters to brotherhood members asking co-operation on secret business of the utmost importance.

Mr. Stone also gave out copies of the following circular:

CHICAGO, April 16, 1888.

*To Chief Engineer and First Assistant Engineer, Division No.——:—*

The C., B. & Q. have only got about one-half of the men prior to the strike. They want about four hundred to five hundred more engineers. We have decided to call on you to furnish one or two men from your division. We will ask the same of all divisions throughout the country to come and apply for situations on the "Q" under an assumed name, and as soon as they get to work to correspond with John Sowers, National Hotel, Chicago, for instructions. The object is to disable engines in every way they can, and on a given day to quit work in a body after receiving instructions from us. The company is on their last leg, and by this means we propose to take the other. We don't want any of them to come here, but to make applications at the following points: Aurora, Galesburg, Burlington, Creston, Plattsmouth, Lincoln and McCook. Be careful whom you select to come—men that don't talk too much or who are in the habit of drinking. Supply them with plenty of sal soda and emery. [To make boilers "foam" and to destroy journals.] Have them get leave of absence for thirty or more days.

P. S.—Please don't let this outside except within yourselves and the men you select to come. Please answer on receipt of this.

Yours fraternally,
S. E. HOGE, Chairman G. G. C., room 34,
Grand Pacific Hotel, Chicago.

Mr. Hoge declared this circular to be a forgery, and denied all knowledge of the dynamite or of the alleged conspiracy. He was, however, on Tuesday (July 10) arrested, together with Chairman Murphy, of the Firemen's Brotherhood, on a

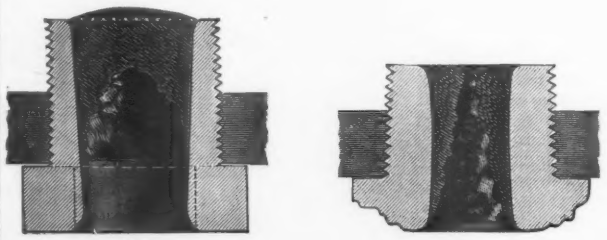


Fig. 1. Fig. 2.

Defective Fusible Plugs.

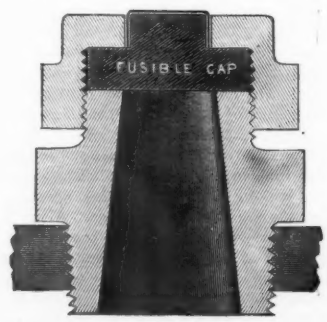
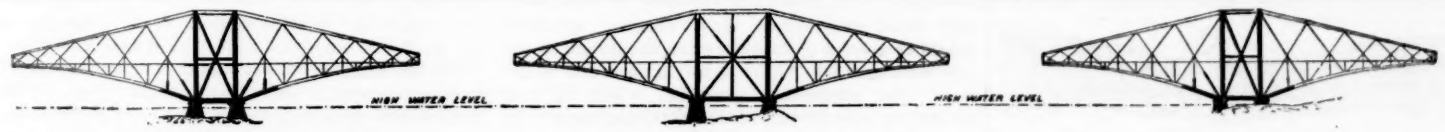
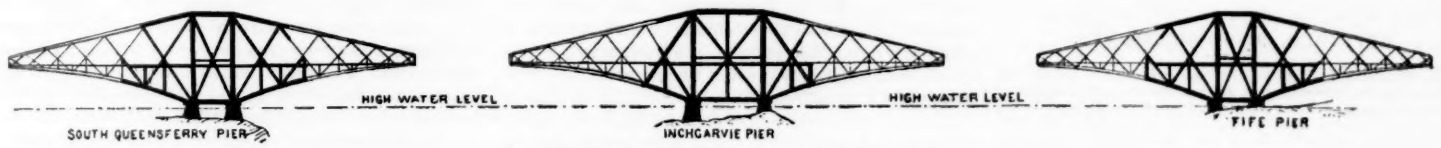



Fig. 3.

The Bailey Fusible Plug.




Showing Work Erected up to the end of June, 1887.




Showing Work Erected up to the end of May, 1888.

DIAGRAMS SHOWING PROGRESS ON THE FORTH BRIDGE.

*These diagrams are taken from "Industries," and are drawn to scale. The gaps between the cantilevers will be filled in with independent girders, 350 ft. span.*

charge of conspiring to injure the railroad's property. They each gave $1,500 bail, and were released. On Tuesday, John J. Kelley and John McGillivery, clerks of Hoge and Murphy, were taken in custody and confessed to the police that they had had a hand in the sending out of the sal soda and emery circular, and had given affirmative answers (by Hoge's direction) to letters asking if it was genuine. They say that letters addressed to John Sowers were received by Hoge. A Chicago *Tribune* reporter claims to have seen this circular several weeks ago, and to have mentioned it to Hoge, who did not deny its authorship.

George Godding, of Aurora, an ex-engineer, and Alexander Smith have been arrested and held for complicity in the plot, but it is surmised that they, as well as the two clerks, are to give evidence for the road.

## The Association of Railway Telegraph Superintendents.

The seventh annual meeting of the Association of Railway Telegraph Superintendents convened at the Murray Hill Hotel, New York City, on Wednesday, June 11. The meeting was called to order at 10 o'clock a. m. by President G. L. Lang, of Boston.

The following members were present:

G. C. Kinsman (Wabash); P. W. Drew, Sec'y (C. & E. Ill.); C. S. Jones (Ill. Central); G. E. Simpson (C., M. & St. P.); S. S. Bogert (West Shore); J. B. Shaw (N. Y., P. & O.); C. W. Hammond (Mo. Pac.); T. J. Higgins (C., C., C. & I.); C. A. Darlton (Richmond & Danville); N. E. Smith (N. Y., N. H. & H.); E. A. Smith (Fitchburg); J. D. Gibbs (Mo. Pac.); E. M. Herr (C., B. & Q.); A. R. Swift (C., R. I. & P.); H C. Sprague (K. C., Ft. S. & G.); H. F. Houghton (Wabash); G. T. Williams (N. Y., C. & St. L.); C. E. Topping; Robert Stewart (Central of N. J.); J. Stenson (Long Island); J. W. Lattig (L. V.); F. P. Cummings (N. Y., N. H. & H.); Horace Johnson (Grand Central Depot, New York); I. Cohen (Houston & Texas Central); M. B. Leonard (N. N. & M. V.); W. J. Holmes (N. Y., L. E. & W.).

The following new members were elected: A. E. Smith, New Haven; N. B. Patterson, Mattoon, Ill.; Robert Stewart, Elizabeth, N. J.; F. W. Wilson, Fort Wayne, Ind.; J. E. Duval, Ottawa, Ont.; W. B. Blanton, Dubuque, Ia.; J. A. Lockard, Atlanta, Ga.; J. G. Pinkerton, Amory, Miss.; C. H. Hopkins, Norwich, N. Y.

After the reading and acceptance of the report of the secretary and treasurer, Mr. BOGART from the committee appointed last year to examine the various devices used for recording the signals transmitted over telegraph wires, made a verbal report. He had examined the self-starting registers manufactured by different firms. The latest devices have the register operated by an electric motor in lieu of a spring or weight.

Commander BROWN, of the U. S. Naval Observatory, being introduced by the President, said that he assumed his hearers would be more interested in the sending out of the time signals than in the methods pursued in obtaining the correct standard. He therefore confined himself to saying that they depended upon the stars for their observations rather than upon the sun, as is more generally supposed. These are made every evening, at as early an hour as is possible. At 11 p. m. the standard clock is compared with the sidereal clock, and the operation is repeated at nine o'clock the following morning, the comparson being made by the chronograph. By this method the error existing at the time is ascertained. Any change in the density of the atmosphere as shown by the barometer has a great effect on the clock. Every day at 11:40 a. m. the officer in charge of the transmitting clock is informed of the error. The standard clock is allowed to run on from year to year without alteration. A great many people put weights on the pendulum to counteract the difference in the rate. At Washington they allow the standard clock to run on and accumulate the error. The transmitting clock is set every day at 11:40, and is kept on Washington time.

In setting it the pendulum is accelerated or retarded until it is brought into unison with the standard, when they are compared by the chronograph. At 11:45 they are as near together as it is possible to get them. This process is repeated every day, whether observations are made or not. If the weather is cloudy the clock must be run on its record. On one occasion, when no observation could be taken for eight days, they found the clock about $\frac{8}{10}$ of a second out, while at another time there was a difference of but $\frac{1}{10}$. The discrepancy arose from the fact that the allowance made for the change in barometer was not so correct in one case as in the other. The time sent out is as accurate as is possible. The transmitting clock is entirely automatic in its action; there is no handling of the key.

They have also a clock system for the local distribution of time, which has finally been adopted after many years of experimenting. The clocks used upon it are the ordinary eight-day clocks, which are synchronized by the transmission of an electric signal at noon each day. They have been in operation about four years. There are about 400 of them altogether, of which 200 are in the government service. During the last year there has been quite a demand for these clocks by the railroads.

It is best to have a standard even if it is not a good one. The Naval Observatory has given time for many years to the Western Union and to the Baltimore & Ohio Telegraph companies and is open to all who ask for it. The importance of standard time could not be overrated. The Washington observatory does not claim to do the work better than every one else, but is noteworthy for the reason that it has a large force to give it their entire attention. In answer to inquiry by the President, Commander Brown said that the clocks in question could not be operated by the signals sent from all observatories. One of their clocks had been left at Altoona to be tested by the Pennsylvania Railroad, but it did not give satisfaction, as the signal stroke sent from the Allegheny observatory was not suitable for it.

The PRESIDENT stated that all the roads running out of Boston obtained their time from the Cambridge Observatory.

Commander BROWN in reply said that every observatory has a different signal. The Naval Observatory has had the railroad service in view for many years. Mr. Jones, of Chicago, having stated that the Limited Time Company obtained its signals from three observatories, viz., Washington, Madison and Evanston, Commander Brown said that this was a very bad practice. This had been proved by experience at New York, where the local time service is in charge of Mr. Hamblet. At one time he received signals from five different observatories. He made a record every day of the error, and it was evident from looking at it that by taking the mean we should get into trouble.

Mr. SMITH (New Haven) stated that there was almost invariably a difference of one second between the time from Washington and Yale observatories.

Commander BROWN stated that at Washington they pay more attention to accuracy and details. At one observatory the weather may be cloudy and another clear. It is much better to take the time from one observatory and stick to it.

Mr. JONES said that the matter of standard time was assuming considerable importance in the West, and when a proper system was shown, it would be generally adopted. He was not sure whether it was safer to rely for accuracy on the enthusiasm of professors or the competition developed between private parties.

Mr. HERR stated that he had been using, about four months, eight self-winding clocks located at various points, which had been synchronized by signals from Chicago. Lately, however, Mr. Pond has started a time company, and is now receiving time signals from two observatories. He proposes to synchronize. His business, comprising different systems and clocks, has been doing very well. They synchronize only when the variation is less than half a minute.

Mr. DARLTON said that the Gardner clocks were in use on the Richmond & Danville over an extent of 2,500 miles. They are set at noon each day. The signals are sent over the railroad wire from Washington. The synchronizing device may be attached to any clock at very small expense.

Commander BROWN, in reply to a question by Mr. Jones, said that the transmitting attachment added to a fine clock did not retard it, as the work required was so very slight. The attachment is not connected with the pendulum. It is on the seconds arbor, but not in the train. Mr. Williams thought that Prof. Gardner's attachment required a very long contact on the 60th beat. The signal which they received from Washington was a very short dot, not even a Morse *e;* it should be as long as a Morse *t*. Mr. Jones inquired if the magnetic influence which caused variation in the rate of watches would apply in any case to clocks. Commander Brown replied that there would be nothing of the kind in the case of a clock. There was no doubt as to the variation in watches caused by magnetism, especially with watches used on a railroad. He had made a great many tests of the Giles anti-magnetic shield, and also the Geneva non-magnetic watches. The Giles watches performed as well as a watch could, so far as their protection under ordinary circumstances was concerned. The shield was not, however, a thorough protection under all circumstances. He magnetized all of them, but had to place them close to the poles of the dynamo in order to do it. The non-magnetic watch was not affected at all. The first he tested he could stop in a magnetic shield, the other sent to him he could not stop. The difference between them was explained by the fact that a steel fork was used in the mechanism of the first watch. The question is not settled as to how these watches are going to wear, as they have been in use but a comparatively short time. Unless we put a shielded watch very close to a dynamo it will not be affected by the magnetic influence. There is no question but that the Geneva watch is compensated for temperature. The balance wheel is made of two different alloys of palladium sweated together.

Mr. LENNARD said that he had made tests with the Giles shield, and had never found it subject to the influence of a Thomson-Houston machine.

Mr. HERR replied that in his test he had used the Ball dynamo, in which the field is much more intense than in the Thomson-Houston machine.

Commander BROWN explained that compensation for temperature is very difficult to obtain. He had just finished testing 40 chronometers which were compensated for a temperature of 70 degrees. The makers have told him that in respect to compensation they work in the dark. We cannot get a watch or chronometer that will run within a second at all temperatures without an auxiliary balance. Palladium has been used as a balance spring for chronometers with the idea that it would not rust, but the metal was not satisfactory as a spring. It does not act the same as steel, and its use for that purpose in chronometers has been abandoned.

The PRESIDENT inquired of Mr. Bogart whether the time signals from Washington were sent direct through the New York office to New England, or whether repeaters were used.

Mr. BOGART replied that the signals passed through four repeating points in the New York office.

Mr. JONES stated that in 1869, while at Albany, he carried on experiments for a year or two in conjunction with the professor in charge of Dudley Observatory. They made up a metallic circuit of 2,000 miles, and they fixed the speed of the signals over this wire at 36,000 miles per second, $\frac{1}{500}$ of a second being consumed by the move of each armature in the circuit. Very careful observations were made. The armature time must be taken into account, and if its movement is sluggish the time occupied is more than $\frac{1}{500}$ of a second.

There being no further discussion of the time question, Mr. C. E. Toppin announced that the Hon. J. H. Starin had invited the Association to visit Glen Island. The Long Island Railroad had also extended an invitation to visit Manhattan Beach, and Superintendent Holdridge, of the Woodruff Palace Car Co., had provided coaches.

The President announced that an invitation had been received from Mr. Henry Harley to visit the tunnel on the West Shore road, and examine the working of the signals at that point. Mr. Bogart stated that Superintendent C. W. Bradley would furnish an engine and coaches. The signals referred to were a new departure. They count every pair of wheels that goes on a block, and report the same number as they pass off. The thanks of the Association were voted to the various parties extending the invitations, and it was decided to visit the West Shore signals on Friday. At 1 o'clock p. m. the meeting adjourned until Thursday morning at 10 o'clock.

## Boston & Albany Sleeping Cars.

The first of the six new sleepers made for the Boston & Albany by the Harlan & Hollingsworth Co., of Wilmington, Del., has been received. The car is very finely finished, and contains the best devices known in sleeping cars. It is painted in the standard dark brown, and lettered like the common passenger cars. The main saloon takes up all the room except a short space at each end. There is no state-room, thus giving extra space for berths. The interior, except the smoking-room, is finished in natural cherry and is elaborately carved. The upholstery is old gold and the carpet and hangings are old blue. The seats are upholstered in a luxurious manner, with heavy bolsters at the top of the high backs. The end of the seat is relieved by an open section studded with spindles. The car is high, giving space for large windows, making the interior lighter than the ordinary sleeper. The smoking-room is finished in antique English oak. The washbowls and faucets are nickel-plated and highly finished. The chandeliers are burnished brass. There is a continuous row of ventilating windows of old gold glass in the flat-decked roof. The ceiling is done in bird's-eye maple decorated with flower designs in oil.

RAILROAD GAZETTE

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At 73 Broadway, New York.

## EDITORIAL ANNOUNCEMENTS.

**Contributions.**—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

**Advertisements.**—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

A noteworthy point in the British Board of Trade Inspectors' reports, which we summarize in this issue, is that concerning audible danger signals as adjuncts to the ordinary semaphore. Although English roads have to contend with much worse fogs than anything experienced in this country, they seem not to have adopted any mechanical device to meet the difficulty, the universal dependence being upon trackmen stationed at the signals to watch the arm and put on or take off torpedoes according to its position. The Palmer torpedo signal, which is in use on the New York City elevated lines, gives great satisfaction there, we understand; and there seems little doubt that the principle embodied in this device deserves more attention than it receives. It is noticeable that many of the collisions detailed in the report referred to happened in the night (or at least when it was dark or foggy), and that few of the trains were running rapidly. While it may not always be easy to decide where to place a home signal torpedo, it is evident that even if placed exactly opposite the semaphore it would often mitigate the effects of collisions, and quite likely sometimes prevent them. And in this position it is a valuable aid in the discipline of runners who run a few feet past the post with careless frequency. If they know that such loose behavior will proclaim itself by an explosion in every instance they will become more circumspect. Another of the English collisions illustrates the advantage of having distinctive tail lights, such as were alluded to in the *Railroad Gazette* week before last.

In view of the varied and important uses to which electricity is put in railroad working, there is another accident in the British report that is especially noteworthy, that at Portland road, on the Metropolitan Railway. The road was equipped with the most approved signaling apparatus known to English practice. The block system was in use; there was a system of signals for communication between the men in charge of the block signals; and, besides, there were electric locks for each man's lever to prevent his giving an all clear signal until the lever had been unlocked, which unlocking could not be done until the train which last entered the section had passed the next signal and operated a track instrument beyond. It was supposed that the combination of these three systems made an accident practically impossible, no matter how careless or incompetent a signalman might be, and for all circumstances known to previous experience, this was the case. The fact that an accident did happen teaches us that even with the best appliances known to human ingenuity, we should be constantly on the lookout for accidents, not only of kinds with which we are familiar, but of a character we do not expect to see. In this case the derangement was of such a character that not only did the signalman, who used the instrument, fail to discover it, but even a careful examination by one of the most competent of railroad electricians did not reveal it, and it had not before been known to occur. It was also intermittent, and its detection was therefore specially difficult.

This emphasizes what the *Railroad Gazette* has before called attention to, viz.: Electric apparatus should be applied to important uses in railroad service only with such safeguards as will at once detect failures. The underlying principle, which is only touched upon in the conclusions of the examiner of the Board of Trade, is that any derangement of, or accident to, the apparatus as can, in the least degree, impair its successful working, shall (1) either cut off the electric current altogether, or (2) divert it to some alarm apparatus which shall call attention to the defect, or (3) apply to the movable parts of the instrument a lock which shall absolutely prevent its use until the defect is found and remedied. This last is by far the safest. Electricity is much the most convenient of the forces of nature, the easiest to use, and with proper precautions as safe and reliable as any other; but only when it is made, as it can easily be, to watch for and give notice of its own failures as it often does of those of other apparatus. This certainly complicates the apparatus and adds to the expense, but greatly increased safety is the result. Between cheapness and safety there should be but one choice.

Judge Gresham has dissolved the injunction obtained by the Pullman Company against the Wagner Company in the vestibule case. Of course this settles nothing permanently. The matter will undoubtedly go to the United States Supreme Court before it is decided. But the recent tendency of Supreme Court opinions makes a final decision in favor of the Wagner Company much more likely than it would have been ten years ago. The history of patent law in the United States has been somewhat curious. For about half a century the Supreme Court showed a disposition to decide doubtful points against the patentee and in favor of the public; that is, to restrict the monopoly as far as possible. For some reason a reaction set in forty years ago, and from 1850 to 1880, or thereabouts, the whole tendency was to construe the rights of the patentee as liberally as possible. During this period a great many abuses crept into the administration of the law, which often caused great hardship, and which threatened to produce a popular reaction against the whole system of patents. It is hard to say whether the Supreme Court was affected by the abuses themselves, or whether it merely reflected the change in popular sentiment; but at any rate, since 1881 its decisions show an unmistakeable tendency to interpret doubtful points of patent law in a way to limit rather than encourage monopoly. Precisely what the Supreme Court will do in this case, it is, of course, impossible to predict; but it is safe to say that where there is any real doubt or question of principle, it is, in its present temper, by no means unfavorable to the Wagner Company.

Live stock rates are to-day quoted at 5½ cents per hundred from Chicago to New York or Philadelphia, and 3½ to Baltimore. Dressed beef rates are reported as 10½ 8½, and 7½ cents to three cities named. It is not impossible that matters may have gone still further before this paragraph reaches our readers. Every one is asking when this sacrifice of railroad property is to reach its limit. To this question no answer can be given, for the simple reason that there is no such natural limit. In many commercial transactions the cost of service furnishes such a limit; but in railroad business this is not the case, for the cost of handling competitive traffic is in large measure dependent upon the volume of traffic secured. There are times when the cost of not doing the business is almost as great as the cost of doing it. To lose traffic at a 30 cent rate is sometimes worse than to gain it at a 10 cent rate. Under such circumstances if one railroad cuts rates all the others must follow suit until every body is tired of it. The only limit is the limit of endurance. No satisfactory means has been devised for really settling such questions. But a good pooling system does much to prevent them from arising. It avoids the suspicion of bad faith which so often precipitates reckless wars of rates, and it enables the roads to take responsible and systematic action in matters involving the common interest of rival lines. In the present case railroad investors are paying the natural penalty for the unwise provision by which the trunk line pool was brought to an end. There are but three possible terminations to the affair, financial exhaustion, consolidation or disobedience to the law. We cannot predict which will be the result, very likely it will be a combination of all the three.

In the Mississippi Valley matters have gone much further than in the East, both in legislative interference and in the reaction against it. Not merely is the conflict of interests under the Inter-state Commerce law sharper, but the results of state legislation have been more severe. The Nebraska Commission has followed the example of that of Iowa in reducing rates; and it has even gone so far as to listen to a complaint (we presume without result) from a railroad laborer who thinks $1.25 a day insufficient wages for the work which he has to do. Under these circumstances it is hardly surprising if the railroads refuse to conform to the new system. The stand which one road is making against the application of the short-haul clause undoubtedly finds support from others similarly situated. The efforts to secure an injunction against the Iowa Commissioners who have exercised their power by making low rates compulsory have not been without success thus far. We see that the Illinois Central has recently set at naught the authority of the Mississippi Commission in the same matter. It is hard to predict what will be the final result. Perhaps it may not be unlike what it was in the Granger legislation twelve or fifteen years ago. At that time the matter remained in suspense so long that a reaction against excessive legislation had already set in. When the constitutionality of the laws was finally upheld by the Supreme Court in 1877, the danger from such legislation had, for the time being, pretty much passed away. At the very moment when it was decided that there was no constitutional objection to such laws, people had just found out that there was the strongest economic objection to them, from the point of view of the community, and they were content to repeal them or to let them remain in abeyance.

The continued payment of commissions on ticket sales, which the lines west of Chicago have persisted in notwithstanding their agreement with eastern lines to refrain from the practice, has finally led to action on the part of the Cleveland, Columbus, Cincinnati & Indianapolis which will probably put an end to the farce. This road has notified the Chicago & Alton (which, it will be remembered, refused to sign the agreement and was therefore excluded from representation in the ticket cases of the eastern lines) that it will henceforth sell tickets over the Alton the same as over the other roads in that territory. The Baltimore & Ohio is also said to have resumed the sale of tickets over the Alton. Verily, as Mr. Fink says, "there is no kind of agreement that cannot be evaded," and in the matter of paying commissions there is apparently no kind that *will* not be evaded. The superiority of piece-work over the day's work system is as keenly appreciated by the general passenger agents as in the car shops, and they seem bound to avail themselves of it, whether it necessitates lying or not.

The letter by "Eshava" in another column refers to articles in the *Railroad Gazette* of Nov. 4 and Nov. 11 last. While his points are not all new, he writes from experience, and it is well to have them in black and white. It is to be hoped that the prediction concerning the cure of some of the present "nonsense" will come true. While we shall not now discuss this letter, the allusion to joint tariffs is so suggestive that it deserves a word. The common practice of a road in the West making through rates over Eastern roads without the specific concurrence of the Eastern line (or *vice versa*), so that the latter is perplexed by claims based on errors in through rates, for which "the tariffs are not at hand" (to use the language of "Eshava") is really unbusinesslike, and patrons cannot be blamed for finding fault when a road is ignorant of the rates for carrying goods over its own line. The common sense view of a bill of lading naming a rate from San Francisco to New York would be that the Eastern terminal line is as much a party to the rate as is the initial road, and therefore equally competent to correct errors in it; and it would be well for roads to "humor" consignees in holding this view notwithstanding the fact that the Inter-state Commerce Commission is apparently inclined to approve the present practice. Clerks who carelessly insert too low rates in bills of lading ought now to be happy, for it is apparently true, as Eshava says, that when the General Freight Agent assesses them for the amount of the error they can retort that he is liable before the law if he does not compel the consignee to "settle up" at published tariff rates. The number of *bona fide* complaints of discrimination on this score will probably not however necessitate the employment of many additional clerks in Judge Cooley's office.

### Standard Axle for 60,000-lb. Cars.

The adoption of a standard in any part of car construction requires the agreement of numerous persons, and is therefore necessarily very difficult to accomplish. The difficulty may, however, be diminished by making the standard elastic as regards details, though rigid enough to insure convenience of interchange. This method is not universally applicable, and it has consequently been suggested that two standards be permitted in cases where irreconcilable differences of opinion prevent the general adoption of a single standard. It is obviously preferable, for instance, that two standard brake-shoes should be used if the railroads are unable to agree on one standard, for it is obviously cheaper and more convenient to keep two patterns in stock than twenty.

When the proposal to adopt an M. C. B. axle was first discussed considerable difference of opinion existed as to the length and diameter of the journal. Some urged that a small journal would be sufficient and others argued that the superior wearing powers of a large journal rendered it decidedly superior.

A similar controversy exists now with regard to the proposed standard axle for 60,000-lb. cars. Many master car-builders believe that it is very advisable that such an axle should be of very similar length to that now in use, so that the 60,000-lb. axle, when worn, can be transferred to 40,000-lb. cars for further service until completely worn out. Others maintain that an increase of 50 per cent. in the load warrants a similar increase in the strength and bearing surface, and that this cannot be obtained within the limits of the M. C. B. journal box, and that the new axle should be designed primarily with a view to its strength, durability and suitability for its purpose, and that these absolutely necessary qualities should not be sacrificed to the very secondary purpose of utilizing it when worn by the insufficient bearing surface provided. It was resolved at the last Master Car-Builders' Convention to submit an axle for adoption for letter ballot.*

This axle is increased in diameter in the centre and in the wheel seat, and is thereby strengthened nearly in proportion to the increased load. The journal, however, has been but slightly increased in length, in order that it may still be used in the standard M. B. C. journal box, and as the increase in diameter adds little to the bearing area and increases the speed of the rubbing surfaces, the journal of the proposed axle when used under 60,000-lb. cars can hardly be expected to wear as long or run as cool as the existing axle when used under 40,000-lb. cars. It will, however, probably suit the views of those who consider that 60,000-lb. cars will for many years be the exception rather than the rule, and that as far as possible no marked departure from existing standards should be made for such cars, while they will run well if care is taken to use only new axles under the heavy cars, transferring the axles when worn to lighter cars. Such a solution subordinates the mechanical side of the question and is confessedly a temporary arrangement which must be set aside in the course of a few years, when it is reasonable to expect that the increased strength and weight of cars and higher speeds will render necessary improved construction in many parts of our cars.

It is, however, by no means certain that the time is ripe for settling definitely on a new standard axle which shall be in all respects thoroughly efficient under the heaviest 60,000-lb. car. A little consideration will show that such an axle involves many serious alterations in existing standards. The present M. C. B. journal measures 7 in. × 3¾ in., and it is generally admitted that the bearing surface is sufficient for a 40,000-lb. car. The value of this bearing surface can be measured by the product of the length and diameter of the journal, and this quantity, 26¼ sq. in. for the 40,000-lb. car, should be increased at least 50 per cent. for the 60,000-lb. car, which as generally built now is fully 50 per cent. heavier than the 40,000-lb. cars built a few years ago. The tendency toward stronger cars is very marked, and there can be little doubt that cars weighing empty 36,000 lbs. and often loaded with over 60,000 lbs. will require a bearing surface on the journals fully 50 per cent. greater than that used in the M. C. B. axle which was orignally designed for 40,000 lbs. capacity cars, weighing not over 20,000 lbs., or 60,000 lbs. in all, against 96,000 lbs. The larger journal should, therefore, have about 40 sq. in. of bearing surface. If the diameter of the axle is so increased that its strength is in proportion to the increased load, the new journal should measure 4½ in. diameter, and the requisite bearing surface would be given by a length of 9½ in. This long journal would necessitate a longer journal-box and brass, a longer axle, and the greater distance apart of the centres of the bearings would render advisable some alteration in the length of the truck transoms.

These alterations open several questions. The adoption of a standard truck has often been debated, and many designs have been made of an improved truck. The defects of the present diamond truck are widely acknowledged, and the general adoption of heavier cars, run at higher speeds, will only make the shortcomings of the present diamond truck more patent. The increase in the load not only throws a greater strain on all parts of the truck, but the concentration of a weight of nearly 48,000 lbs imperfectly equalized upon a 5 ft. wheel base severely strains the permanent way, and where a flat wheel, a rotten tie and a defective splice bar happen to coincide, a broken rail or a derailment is probable. If a new axle, a new journal-box and brass, and an improved truck with longer wheel base and transoms are all required for 60,000-lb. cars, it would be well to consider them together and make the punishment fit the crime by making a new departure, and designing the axle, journal box and truck specially for the larger car without regard to existing standards. The proposition that an increase of 50 per cent. in weight needs little increase in the means of carrying that weight, hardly merits serious consideration, and the increased capacity of cars and speed of trains emphasizes the need for a corresponding advance in the M. C. B. standards.

*This axle was illustrated in page 403 of our issue of June 22, 1888.

### The Arrests at Chicago.

The troubles growing out of the Burlington strike are by no means at an end. A few days ago the authorities of the company secured the arrest of several of its old employés on the charge of intending to use dynamite for the injury of the company's property. These arrests were followed by others on secondary charges; and the matter has culminated in the arrest of Hoge and Murphy, chairmen of the committees of striking engineers and firemen respectively. They are charged with conspiring to injure the property of the company; this charge being based upon a circular which was distributed among the divisions of the Brotherhood of Locomotive Engineers, suggesting means by which the machinery could be disabled. The accused deny all complicity in this suggestion, and claim to have known nothing of the circular. The trial alone can show what evidence there is on either side.

The facts alleged are serious enough; but still more serious is the light which they throw on the state of feeling which is too common among railroad employés in many parts of the country. Whatever be the facts in this particular matter, there can be no doubt that there were threats of a general strike in case the Burlington people pushed their case, and that these threats caused no slight apprehension in the minds of those interested in other railroad systems, as well as among the traveling public. It is, we believe, admitted that Chairman Hoge, among others, expressed himself in this way. Let us see what may be fairly inferred from this state of things.

First, a lack of confidence on the part of the men in the fairness of the courts. This is the most favorable ground on which such threats can be justified. Men are arrested for a grave crime—the attempt to use dynamite. There was at least a *prima facie* case against them, for dynamite was found in the seat with them. What do the leaders do? Do they await the result of the trial to let the men prove their innocence if they can? No. On the contrary; they threaten grave disturbance to business in case the matter is brought to a full judicial issue. If they do this while believing the men guilty, such conduct is simply revolutionary. If they believe that the men are innocent and will be acquitted, there is no motive for such conduct. There is only one other alternative left. They may believe that the men are innocent, but that they do not have a fair chance before the courts.

This, as we have just said, is the most favorable construction which can be put upon the present state of feeling. But even this is bad enough in its logical consequences. Of all the conservative forces in our social and political life, respect for the courts is the most important. It is unfortunately true that there is a great deal of feeling among the poor that they have no fair chance in the courts. There have been many cases which gave ground for this feeling; and it was inevitable that it should extend beyond the limits for which there was just ground. But it has not hitherto proceeded to the length of actually obstructing the administration of justice on a large scale. If any considerable number of the community should be willing to go to that length, we should be delivered over to the anarchists. Modern industry and modern life are possible only as people acquiesce in the decision of the courts whether they like them or not. The laws themselves can be changed without any great strain on social order; but the attempt to set at naught their execution is simply revolutionary.

There is a menace to social order, not merely in the intention of some of the labor leaders, but in the way in which they proposed to carry it out. They practically threatened a general strike in case one road persisted in an objectionable course. In other words, they proposed to attack railroads as such, on account of their objections to the course of one particular railroad. This is one step worse than anything which was done in the most extreme cases of boycotting. The boycott punished an employer who had not done anything specially objectionable for maintaining business connections with certain others. The policy here proposed would punish him directly for something over which he has absolutely no control in any way, simply because all capitalists as such are identified in the minds of a certain class of laborers as being their natural enemies.

In certain parts of the country labor agitation is taking a communistic character. The common interests of employer and employé are lost sight of; whatever is hostile to the one party is supposed to be favorable to the other. The proposals now made by some of the extremists furnish a dangerous case of this hostility to capital as such.

We do not mean to say that a majority, either of the leaders or of the rank and file of the strikers, are communists. We do not mean to say that they desire a revolution, or deliberately wish to defy the laws of the land. On the contrary, Chief Arthur and the great body of conservative men in the Brotherhood totally disclaim any such intention, and refuse all countenance to the objectionable proposals. But it remains to be seen how far they can control the course of events. It is one of the most serious evils connected with labor organizations that the radicals have so great an advantage in determining the action of the whole body. The Missouri Pacific strike two years ago was an instance in point. It was the work of a small minority of men with selfish aims. Neither the central authorities of the Knights of Labor on the one hand, nor the great majority of the men who engaged in the strike on the other, regarded it as a wise measure. Yet when a few local leaders precipitated a conflict on their own responsibility, their followers rushed blindly on against their own better judgment, with great disaster to all interests affected, and most of all to themselves. This is but one instance among many. When a headstrong course of action is fairly started, sentiment gets the better of reason.

This is what makes the present case critical for the railroads; and in a wider sense it makes the present state of feeling a critical one for the country. We do not know what evidence the Burlington has against the men arrested, or what evidence they have in their own favor. But whatever may be the merits of this particular case, we know that the attempt to interfere with the jurisdiction of the courts is dangerous to society, especially so when the more radical leaders have it in their power to commit so many of their followers to acts of hostility to capital which a large part of them in their sober judgment would not approve in principle nor desire to see carried out in practice.

### Grade Crossings.

A highway crossing accident at East Weymouth, Mass., on the Old Colony, is made the subject of a special report by the Massachusetts Railroad Commissioners. Two men in a carriage were killed as they attempted to cross the track, about 10 p. m. There were gates at the crossing but they were unattended after 8 o'clock in the evening. Although the train could be seen and heard, "it is possible" say the Commissioners, "that the men trusted entirely to the gates." The report goes on:

> "To those who frequent such crossings and know that a gateman is generally on duty the fact that the gate is not closed is an assurance that no train is due. The upright bar of the gate is a safety signal, and if it is a false signal it is a source of danger. . . . The Board has heretofore expressed its views as to the danger resulting from the withdrawal of gateman or flagman during the time when trains are running. The Old Colony has now put on extra men for all crossings where trains run frequently during the night, and such crossings will be guarded for all trains during the 24 hours. Other protected crossings will be guarded until all schedule passenger trains for the night have passed."

The problem presented in cases like this is not an easy one. If the Old Colony can afford to keep its gates manned all night, it is fortunate. If the highway were a railroad, a rule that those traveling upon it should not attempt to cross without first seeing a positive "all clear" signal would be the obvious

remedy. But railroads do not like to increase their responsibilities in this direction. To tell night wayfarers "Do not cross unless you see the gateman," implies telling day travelers the same; and this necessitates instructing the gatemen to always be in sight, and to not only *allow* people to cross when it is safe to do so, but to beckon them on. This practice, however, would take the spice out of a good many law suits, for when the gateman made a mistake, he would not only be setting a trap but would be enticing people into it. Old-fashioned gates which shut across the railroad when not closed across the highway are still considerably used in England, and they constitute, of course, a positive "all clear" signal for teams when not turned so as to be to them a positive stop signal; but English engineers occasionally dash through and smash them. Our signs "Railroad Crossing," "Look out for the Engine," etc., are of little or no value in a dark night, and perhaps there ought to be a reform in this particular. The courts agree that wayfarers are bound to look and listen, if not to "stop, look and listen." Why not have an illuminated sign to this effect, to be put up when the gateman goes off duty? Certainly the least that a road can do is to provide for a marked difference between the sign that confronts travelers when the gateman is on duty and that which they see when he is *not* there. An automatic electric bell is strong presumptive evidence that there is no watchman at a crossing, and is, perhaps, tolerably effective, except with very ignorant or careless people; but, unfortunately, some very respectable roads take poor care of nominally good bells, allowing them to work in the most inefficient and deceptive manner.

Highway crossings are prolific sources of litigation, and therefore already receive an apparently disproportionate share of officers' attention, but they could profitably receive still more. An inflexible rule to always give wayfarers enough warning—neglecting all care about giving too much—does not solve the problem. The Supreme Court of New Hampshire has lately awarded damages to a man whose horse was frightened near a crossing by "violent" whistling. If prominent roads would formulate a sensible set of regulations and enforce compliance with them they might perhaps in time get some favorable decisions from the courts; they could at least justify themselves better than they generally do now. There are so many classes of crossings that nothing but careful supervision and discipline can adequately provide for reasonable safety at all times, while at the same time giving the minimum of offense to quiet-loving residents. City and town crossings demanding constant attendance; those which can be left alone at night but not by day; those which warrant the expense of an automatic warning, but which cannot be provided with a watchman; those which must be watched for fast trains, but at which slow or switching trains can be trusted to "flag themselves across;" those which are too small for any special attention—these several kinds, in different kinds of weather and for different speeds of trains, constitute a variety of circumstances for enginemen to take cognizance of that can be properly dealt with only by careful and regular supervision. The practice of leaving the question of when and where to whistle and ring (and how loudly) largely to the judgment of the runner, while perhaps tolerably satisfactory, will always be characterized by inconsistencies, for men's judgment will vary.

The new code of rules of the Old Colony, recently issued, has among its regulations the following, which, while not perfect, are more definite than we generally see:

> Crossing whistles may be omitted in cases specified below, except in cases of storm, fog, dim head-light, or running without notice.
>
> Where two or more crossings are within 80 rods one crossing-whistle of double length will suffice for all.
>
> Where a crossing is at a station, *but beyond*, the whistle need not be sounded by trains that are to make a stop at the station.
>
> Where a train has stopped at a station, the whistle need not be sounded for any crossing within 80 rods of the station.
>
> Where flagmen or gatemen are employed the whistle may be omitted by regular trains during the regular hours of the flagmen or gateman. * *
>
> Where regular trains are run by night through thickly settled portions of cities or towns, the whistle may be omitted except where the view is limited, etc.
>
> In all cases, however, great care must be taken to give ample and sufficient warning by the ringing of the bell.

## Train Speed Through Towns.

The New York, New Haven & Hartford, having petitioned the Connecticut Railroad Commissioners for leave to run trains over the grade crossing of the Housatonic road at Bridgeport without stopping, the Board has, after a public hearing, granted the permission for two trains only, the fast expresses leaving New York at 3 and 4 p. m.; and the speed is limited to 15 miles an hour. Interlocking signals have been recently put in, and the only apparent reason for not granting the privilege to all trains is the objection made by residents of Bridgeport, who allege the imminence of all sorts of dangers if trains are not stopped at the station. Connecticut towns seem to be very jealous of their dignity and prerogatives. Meriden, which has until recently been coddled by the stopping of every train on the time-table, is now reported to be feeling exceedingly sour and ugly because one express train has the impudence to pass that burgh without halting.

This feeling, and the similar sentiment which dictates municipal restrictions of speed, are rooted in the feudal principle that every hamlet may erect a fence and tollgate and levy tribute on all strangers; and the unreasonable stipulation which railroads have in some cases allowed themselves to be saddled with in accepting grants of right-of-way serve to keep these absurd notions alive. Of course, every town desires trains to every other town every 30 seconds, day and night; and through the necessities of the railroads many places have been favored with a service very much nearer this ideal than the volume of business warranted; now when the railroads find themselves free to adopt better methods, any and all available arguments are used to thwart them.

There are of course often good reasons for calling railroads to account in this matter. The practice of running passenger trains at 30 miles an hour or faster past a platform filled with people to its very edge, and the short-sighted policy which will neither provide watchmen nor bridges at crossings nor slacken the speed of trains, give town authorities good reason for demanding redress of a real grievance; but where the correct principles are understood and are properly set forth by an impartial commission, it is a pity that the question cannot be considered on its merits. A train which is already filled with passengers for Boston has no more occasion for stopping at Bridgeport or Meriden than has a train load of flour or coal bound for the same destination, and if the population of a way station were 500,000 instead of one-tenth that number, the case would be little if any altered. The real question with a way station, whether it be New Haven or Worcester or Cos Cob, is, are we fairly treated as compared with other places similarly situated, and with the treatment we have received heretofore? Are we neglected to favor other places? Are Boston and New York favored at our expense? If all towns had their way the New York Central and Pennsylvania limited trains would not reach Chicago until the middle of the following week. Those places which could not scare up a passenger would want the train to "slack up" while they drove their cows across the track. But however illogical towns and cities may be the railroads have a duty in the premises, and one which they have in many instances neglected, as intimated above. Our prevailing fashion of having platforms very low, often on a level with the rail, tempts people to step upon the track with great lawlessness, and renders station watchmen and policemen much more necessary than otherwise would be the case.

Experience with the immense traffic of the New York elevated roads, and of English roads, shows very clearly that without the high platforms there used the problem would be vastly more complicated. The ideal way station should have a fence between the passenger platform and the tracks used for the passage of fast trains, and the system put in force on the four track lines of the Pennsylvania approaches this. Certainly platforms should be wide enough to remove all temptation to persons to step upon the track for lack of room, and large stations which still have narrow platforms should be among the first to be rearranged. So long as they are not improved the road cannot argue very vigorously against the demands of the towns. Fifteen miles an hour, the rate proposed at Bridgeport, is quite moderate, but the trouble is that runners with a few minutes to make up will stretch the limit.

The latest rapid transit scheme announced for New York City is that of the "People's Rapid Transit Company." The company is "about to be organized" it is said. From the route indicated and the names connected with the project, it is evidently an off-shoot of the New York & Boston Rapid Transit, of which little has been heard lately. The plan as outlined is for a viaduct road the length of the city, running west of Tenth avenue, and crossing the Harlem and going finally to Tarrytown. The metropolitan part of the road is to be on a double-decked viaduct, with two tracks on each deck, right of way to be purchased through the blocks. That the promoters of this project have the correct idea of a really adequate and satisfactory railroad for the city we do not doubt. A company buying its right of way from one end to the other of the island, and building on a substantial masonry viaduct could give the city the best service and the least annoyance of any of the many plans suggested. Considering, too, that it would have a good deal of rentable store room on its right of way, it is not unlikely that it could pay fair dividends on the enormous cost of such a line. One cannot feel very sanguine over a New York rapid transit company which is not yet organized, and the ratio which the performance of the New York & Boston Rapid Transit Company bears to its promises does not inspire one with much hope for this last project. Nevertheless, we wish it success.

The petitions sent to Congress several months ago concerning Federal legislation on the subject of uniform freight car couplers, freight train brakes and couplers for continuous steam heating, apparently will not receive any attention at this session. Mr. Cullom, Chairman of the Inter-state Commerce Committee in the Senate, has promised to take the matter up, and the House Committee on Commerce has agreed to take action; but as the hot weather now upon us always abates the energies of Congressmen, and the Tariff bill so overshadows everything else, there seems no likelihood of a bill being considered if formulated. Opinion as to what Congress can or should do in this matter is not very definite, but it does not seem advisable to add to the burdens of the Inter-state Commerce Commission with its present organization, and with the money now available for its work.

There has been for some years on the statute books of the state of New Jersey a law, the object of which is to add to public convenience at railroad drawbridges. This law provides that when a suitable signal is displayed on a drawbridge, vessels must stop. It is provided further, however, that suitable signs must be placed on the banks 1,500 ft. above and below the bridge, calling attention to the meaning of the bridge signal. We do not know that any of the roads entering Jersey City have heretofore availed themselves of this law, but it is said that the Erie has now equipped its main line draw over the Hackensack with the necessary signal and distant signs, and that river craft will be required to stop when trains are approaching. The innovation will meet a good deal of opposition, but it seems sensible. While the law should jealously protect the rights of the people on the natural highways, those who travel by the artificial ones have also some rights; and the relative proportion of inconvenience does not seem rightly adjusted when a train-load of 250 people is made to lose 15 minutes time to accommodate a grinning boy in a cat-boat.

The passenger trains on the Sandy Hook division of the New Jersey Southern are subject this season to a somewhat novel form of competition. The line runs along a sandy spit, the sea on one side and the Shrewsbury River on the other. Numerous seaside resorts and country towns are situated near the river, which is navigable. A couple of fast Herreshoff steam launches run on the river on a two-hour schedule and carry a considerable number of passengers. Though claimed to be the fastest steam launches in the world carrying passengers, they are easily passed by a train which makes several stops. The launches are open, with an awning in the form of a car roof supported on posts. The woodwork of the hull is simply varnished, showing the grain of the wood. The boats appear to be well patronized, and afford a very pleasant and convenient mode of transit, which might be extended to many other summer resorts.

In the report of Lieut. O. M. Carter to the Chief of Engineers, it is said that in the year over $1,000,000 was spent on the Savannah River. A navigable channel has been obtained, with a least mean low water depth of 12.4 ft. Vessels of from 20 to 21 ft. draught now go from the city to the sea on a single tide. Over $6,000,000 is necessary to obtain 28 ft. of water throughout the channel.

Col. H. M. Robert recommends the formation of a channel from a point in the Delaware River near the upper part of Philadelphia to deep water in the Delaware Bay, with a least width of 600 ft. and a depth of 26 ft. at mean low water. The estimated cost of this work is $2,425,000, exclusive of any improvement on that part of the river between Bridesburg and Trenton. It is also exclusive of any expenditures for the formation of an improved cross river channel between Philadelphia and Camden. An appropriation of $600,000 is asked for the work referred to for the next fiscal year. He says it is not considered in the interests of commerce and navigation to recommend further appropriations for the improvement of Frankfort Creek. If funds become available for continuing the improvement of the river a project will be submitted for the improvement of the bar at the mouth by means of a dike in connection with dredging. An appropriation of $75,000 is asked for this work for the next fiscal year. It is estimated that $35,000 will be required to complete the improvement of the ice harbor at Marcus Hook, of which $30,000 should be made available for next year's work. A project is submitted for an iron superstructure for the pier in Delaware Bay, near Lewes, at an estimated cost of $93,000. The amount to complete the work at the Delaware breakwater is estimated at $545,000, of which $300,000 is required for the next fiscal year.

The Department of Agriculture makes the July general averages of condition as follows: Cotton, 86.7; winter wheat, 75.6; spring wheat, 95.9, corn, 93; oats, 95.2; barley, 81; winter rye, 95.1; spring rye, 96.8; tobacco, manufacturing leaf, 89. Cotton is later than usual in every state, but the plant is generally in vigorous condition and growing rapidly.

Winter wheat has been harvested in the South, and yielded below expectation in the Carolinas, Georgia and Alabama. It has improved slightly in Pennsylvania, Ohio, Indiana and Illinois. A marked improvement is noted in Michigan. Reports from the Pacific Coast are also more favorable. The general condition has advanced from 73.3 to 75.6. Spring wheat has improved in a large portion of the breadth seeded, and promises a large yield. The general average has advanced from 92.8 to 95.9.

The area of corn has increased over 4 per cent., to nearly 76,000,000 acres. The stand is now moderately good, and the crop is growing finely. Condition by principal states: Ohio, 96; Indiana, 95; Illinois, 93; Iowa, 89; Missouri, 91; Kansas, 99; Nebraska, 91. In the south: Virginia, 91; North Carolina, 88; South Carolina, 87; Georgia, 94; Alabama, 96; Mississippi, 97; Louisiana, 95; Texas, 95; Arkansas, 97; Tennessee, 98.

Within the last week there have been very serious storms and floods in various parts of the country, and particularly in the valleys of the Ohio and the Potomac. At Parkers-

burg, W. Va., a $40,000 bridge was "swept from its moorings," whatever that means, on the 10th, and it is said that a number of bridges and trestles on the Columbus & Northern are gone and "travel indefinitely suspended." On the Baltimore & Ohio at least one bridge is reported carried away, besides trestles, and two or three tunnels were blocked. Through trains were stopped on the main line for two or three days. Washouts are reported on the Hocking Valley and the Chicago & Eastern Illinois. Much damage to crops is reported in the Ohio Valley and in West Virginia. The flood in the Monongahela at Pittsburgh has been "almost unprecedented," and caused considerable loss, mostly by the sinking of coal barges.

Estimated weights for computing transportation charges on lumber have been lately considered by the Alabama railroad commissioners, who were asked by a lumber firm to establish uniform weights per foot for green and dry. No list was issued, but the roads were ordered to weigh carloads in the presence of the consignee. Of course, no inflexible rate of weight can be established for anything but dry lumber, for the reason that the amount of moisture in the wood is so variable at different ages and in different kinds; and even in the case of lumber called dry the variation is considerable. So far as actual weight is concerned the best estimates by the foot will often be wide of the mark; but as there is little or no injustice to, or discrimination between consignees in charging by the foot, railroads would perhaps make a good stroke with shippers and do themselves no harm by charging uniformly by the foot (separate rates for that which has been sawed more or less than — months). Track scales are not perfectly satisfactory unless the tare can be promptly and conveniently ascertained, for the variation in the weight of an empty car, which is often as much as a half ton, is enough to cause dissatisfaction. Getting both gross and tare in the presence of the owner, as ordered by the Commission, will not be very convenient unless the owner will take up his residence near the scale.

The decree of Judge Gresham sustaining the claim against the Receiver of the Wabash for rental for the use of the Toledo, Peoria & Western, is in the same general line as his previous Wabash decision. He holds, in brief, that the Wabash had only a leasehold interest in the T., P. & W.; that the Wabash Company could mortgage nothing more than that leasehold interest; that the receivership was for the benefit of the Wabash and not of the T., P. & W., and its expenses were therefore solely chargeable to the Wabash.

A public meeting of a board of engineer officers of the army was held Tuesday last "for the purpose of affording a free and full discussion of H. R. bill 10,642," which authorizes the building of a bridge across the North River from New York to Jersey City. We gave last week the names of the incorporators of the company. The board included Cols. Casey, Abbot, Comstock and Houston, and Maj. King. The proceedings at the meeting were purely formal, and give no light as to the amount of opposition which the project will encounter.

An appeal for foot-guards is the subject of a communication to the Chicago *Inter-Ocean* signed "Conductor." It is stated that four men have been killed by catching their feet in frogs and guardrails within 15 miles of Chicago courthouse during the past five weeks. We notice in the new code of the Old Colony a special paragraph requiring section masters to see that foot-guards are not allowed to get out of repair.

## NEW PUBLICATIONS.

*Continuous Car Heating.* Abridgments of expired U. S. patents and classified list of all car heating patents. Compiled by Geo P. Whittlesey. Published by the *Railroad Gazette*, New York.

This little work will be useful to all those interested in car heating, and the abridgment of expired patents is especially valuable, as it shows what general features of continuous steam heating are public property. The first patent relating to continuous steam heating describes the coupling for steam pipes and is dated Oct. 9, 1847. The great amount of inventive talent bestowed upon the subject during the last 40 years is only too evident, for the majority of the inventors can have reaped no reward for their labor. Many of the earlier patents relating to continuous heating propose to use hot air. The use of a furnace or boiler in the baggage car is frequently referred to, and one patent states that the auxiliary boiler may be filled with ice in summer to cool the air.

## TRADE CATALOGUES.

*A Primer of Patent Law for Inventors and Manufacturers.* By William H. Finckel, Solicitor of Patents, Washington, D. C.

This little pamphlet gives very briefly some account of what is and is not an invention under the law, and who is an inventor, with definition of the terms "patentability," "interference," and "infringement." There is also given more or less information as to methods of procedure in seeking patents and caveats, with fees, &c.

*Illustrated Catalogue of Well Sinking Machinery.* Goulds & Austin, 167 and 169 Lake street, Chicago, Ill.

This catalogue describes, with numerous and very good illustrations, the implements and methods used in sinking deep wells, from the comparatively shallow prairie wells of 60 to 100 ft. to the deeper oil and artesian wells. A very large demand has grown up in the west for wells of the first mentioned class. They are, in general, put down through ordinary soil, clay, quicksand and hard pan, with the aid of a casing, which forms not only the walls of the wells but also the pump barrel. These, started from the surface, are either driven by blows delivered on the properly protected head of the tube, in which case the material may be excavated either by sand pumps or by the aid of a water jet, or they are sunk by rotating the casing itself, in which case, instead of a steel-cutting edge as for driving, a strainer is fastened to the lower end of the casing, and a pipe, for water under pressure, passes through it, ending in a cutting tool, stirring up the material which passes through the strainer and the annular space, to the top of the casing. One of these wells was sunk 92 ft. 8 in. in one hour and eight minutes, nearly one and a half feet per minute.

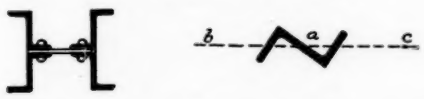
As nearly all of the deep western wells are wet wells, the Pennsylvania rope rig does not work to good advantage in them, and tough second-growth white ash poles have been substituted, to a great extent, for rope, requiring a change in the mechanism of the drilling rig. This is very fully illustrated in this catalogue, as well as the Pennsylvania rig and its appliances.

The catalogue, which rises almost to the dignity of a manual of well boring, contains, within its 96 pages, many cuts of appliances that will be new to all who are not adepts in this art.

## Experiments on Z-iron Columns.*

About a year ago the writer was called upon to prepare plans and specifications for the superstructure of the new bridge of the Chicago, Milwaukee & St. Paul Railway over the Mississippi River at Kansas City. One thousand five hundred and forty-five lineal feet of this structure is a double track iron trestlework of 45 ft. average height. It was found that important advantages could be secured for this part of the structure by adopting for the compression members a new form of cross-section consisting of four Z-irons joined by lattice bars in the middle plane, as indicated by sketch.

As Z-irons were not at the time rolled in this country, it was necessary, for the mill furnishing this material, to prepare rolls specially for the purpose. The Z-shape is obtained by joining two angles as at *a* in sketch, and the rolling corresponds to the rolling of angle iron, the rolls operating with their axes parallel to the line *b c*. It was found that the rolling of the Z-iron presented no greater difficulty than the rolling of ordinary angle iron.




Notwithstanding the higher price charged because new rolls had to be prepared to roll the Z-iron, it was furnished by the mill at a much lower rate per pound than channel iron (for which it acted as a substitute) could have been bought for, and a considerable saving in the cost of the structure was thereby effected.

Other advantages of this form of compression member over two channel bars latticed, the usual type, were thought to be the following:

Economy of material in the lattice bars. These are short, and only one set is required, while two must be used in the other form of cross-section.

Economy of manufacture; only two rows of rivets required, whereas four are needed in the other cross-section.

Protected position of lattice bars and consequent freedom from damage during transportation and in handling.

Possibility of effecting better connections with other members in the design of the structure. This feature was considered an important one, as it is held that the efficiency and serviceability of the parts connected are dependent more upon the method and detail of the connection than upon the particular form of cross-section used for the members themselves.

Having adopted the cross-section described for all the columns and struts in the trestlework of the Kansas City Bridge, it was thought advisable to make some experiments to test its efficiency, and prove that the limits to which the members were to be strained in the structure were safe and consistent.

Owing to the large size of the columns in the structure itself, it was not possible to test full-size specimens, therefore smaller columns were used in the experiments, but of the proportions, as near as possible, of those in the structure. The Z-irons in the latter were 3 × 5 × 3 in. in size and $\frac{11}{16}$ in. thick, while in the test columns 2½ × 3 × 2½ in. Z-irons were used $\frac{5}{16}$ in. thick. Six columns were tested of the lengths 10 ft. 11¼ in., 15 ft., and 19 ft. ¾ in., two columns for each length. The expense of these tests was borne by the Chicago, Milwaukee & St. Paul Railway Co. The results proved to be very satisfactory, and the subject was considered of sufficient general importance to be pursued further. It was decided to test nine additional columns of longer lengths, so as to obtain results covering the limits of actual practice. The expense of these tests was jointly borne by the Chicago, Milwaukee & St. Paul Railway Co. and the Keystone Bridge Co. The additional columns tested were 22, 25 and 28 ft. long, three columns for each length.

The results of the tests of the entire series of fifteen columns are herewith presented to the Society as a contribution on the subject of the strength of wrought-iron compression members.

The tests were made in the hydraulic testing machine of the Keystone Bridge Co., at their works in Pittsburgh, under the supervision of S. C. Weiskopf, M. Am. Soc. C. E., inspector of shop work, on behalf of the Chicago, Milwaukee & St. Paul Railway Co., for the Kansas City Bridge.

The material was manufactured by Brown, Bonnell & Co., of Youngstown, O. The tests made on specimens cut from the Z-irons are shown in Table No. 3. These tests comprise all that were made on the Z-iron of this size furnished for the Kansas City Bridge. It is difficult to determine the elastic limit accurately on the testing machine used (Riehle's 100,000 pounds machine), and it is probable that the values obtained are too high by several thousand pounds to the square inch in each case.

The first six columns tested were made by M. Lassig, of Chicago, and the last nine columns by the Keystone Bridge Co., of Pittsburgh.

The columns were placed horizontally in the testing machine, with the lattice bars in a vertical plane, the ends of the columns abutting squarely against the castings of the testing machine without the interposition of shoes. To counteract the tendency of the column to sag from its own weight, an upward pull was caused to be exerted against the middle of the column equal to one-half its own weight.

All of the columns failed in the direction in which they were theoretically weakest, and in a uniform manner by deflection. The results will be found in the table.

The Z-iron columns compare favorably with other columns in ultimate resistance. The values obtained are near approximations to the Watertown results with Phœnix columns, and exceed those heretofore obtained with other types of columns. This favorable showing for the Z-iron columns should probably be attributed to the fact that the material in the outer periphery of the cross-section, on which dependence must be placed to hold the column in line, is not weakened by rivet holes, but is left solid and unbroken, and is, therefore, in the best shape to do its work effectively.

The writer called attention to the small variation in the ultimate strength of columns of the same type for lengths not exceeding 90 radii of gyration (32 diameters), in his discussion of "Experiments upon Phœnix Column" (Transactions Am. Soc. C. E., C. C., XXXIII.). Excluding very short lengths it was found that the ultimate strength up to at least the limit mentioned (90 radii), was practically constant irrespective of the length, though not the same for different types of columns. The average for Hodgkinson's cylindrical tubes, for lengths ranging from 40 to 90 radii (14 to 32 diameters) was 33,100 pounds per square inch. The average for the Watertown tests of Phœnix columns for lengths ranging from 40 to 110 radii (14.1 to 39.5 diameters) was 35,800 pounds per square inch. The average for Mr. Bouscaren's tests of latticed channel columns for lengths ranging from 59 to 90 radii (21 to 32 diameters) was 32,300 pounds per square inch. The diameters referred to in the above are the diameters of an equivalent cylindrical tube whose area is concentrated in the circumference and whose radius of gyration is the same as that of the section considered.

The present tests on Z-iron columns show no variation in

* Abstract of a paper by C. L. Strobel, C. E., read before the American Society of Civil Engineers, Nov. 16, 1887.

GENERAL RESULTS OF COMPRESSION TESTS OF 15 Z IRON COLUMNS.
*Radius of gyration, lattice bars not considered, = 2.05.*

| No. of statement | No. of column | Length of column. | Weight. Pounds. | Sectional area. Square inches. | Ultimate strength. Actual. Total pounds. | Ultimate strength. Actual. Pounds per sq. inch. | Ratio of length to least radius of gyration | Ult. str. by formula (Rankine Gordon) $\frac{36{,}000}{1+\frac{l^2}{36{,}000\,r^2}}$ | Ult. str. by formula $46{,}000-125\frac{l}{r}$ |
|---|---|---|---|---|---|---|---|---|---|
| | | Feet. In. | | | | | | | |
| 1 | 3 | 10 11¼ | 421 | 9.435 | 347,100 | 36,800 | 64 | 32,300 | |
| 2 | 4 | 10 11¼ | 441 | 9,984 | 345,800 | 34,600 | 64 | 32,300 | |
| 3 | 2 | 15 0 | 570 | 9,480 | 328,000 | 34,600 | 88 | 29,600 | 35,000 |
| 4 | 5 | 15 0 | 560 | 9,280 | 340,000 | 36,600 | 88 | 29,600 | 35,000 |
| 5 | 1 | 19 ¾ | 699 | 9,241 | 312,000 | 33,800 | 112 | 26,700 | 32,200 |
| 6 | 6 | 19 ¾ | 754 | 10,104 | 340,600 | 33,700 | 112 | 26,700 | 32,200 |
| 7 | 7 | 22 0 | 805 | 9,286 | 285,000 | 30,700 | 129 | 24,600 | 29,900 |
| 8 | 8 | 22 0 | 805 | 9,286 | 274,300 | 29,500 | 129 | 24,600 | 29,900 |
| 9 | 9 | 22 0 | 805 | 9,286 | 285,000 | 30,700 | 129 | 24,600 | 29,900 |
| 10 | 10 | 25 0 | 900 | 9,156 | 257,400 | 28,100 | 146 | 22,600 | 27,750 |
| 11 | 11 | 25 0 | 925 | 9,456 | 265,200 | 28,000 | 146 | 22,600 | 27,750 |
| 12 | 12 | 25 0 | 930 | 9,516 | 270,400 | 28,400 | 146 | 22,600 | 27,750 |
| 13 | 13 | 28 0 | 1,025 | 9,375 | 260,000 | 27,700 | 164 | 20,600 | 25,500 |
| 14 | 14 | 28 0 | 1,050 | 9,643 | 270,000 | 28,000 | 164 | 20,600 | 25,500 |
| 15 | 15 | 28 0 | 1,025 | 9,375 | 258,700 | 27,600 | 164 | 20,600 | 25,500 |

the ultimate strengths for columns of 64 radii (23 diameters) and 88 radii (31 diameters) long, the average being 35,650 lbs. per sq. in.

Considering all the tests which have been made on hollow columns with square ends, the writer believes that he is justified in assuming that their ultimate strength is constant for lengths up to 90 radii (32 diameters). This assumption is a convenience in the practical work of proportioning the parts of a bridge, because it saves the necessity of calculating the radius of gyration for the chords and end posts, which is a somewhat laborious operation and cannot readily be simplified by means of tables.

In devising a formula which would satisfy the results of the tests on Z-iron columns for lengths beyond 90 radii, the equation of a straight line was found to answer as well as the equation of a curve, while having the advantage of simplicity. The following is the formula selected: Ultimate strength in pounds per square inch $= 46{,}000 - 125\frac{l}{r}$ for lengths exceeding 90 radii and 35,000 for lengths equal or less than 90. Values for this formula are contained in the table. The deviations from the results of tests are on the safe side.

It has been customary to allow 8,000 lbs. per sq. in. in compression for bridge members of short lengths, which corresponds to a factor of safety of $\frac{35000}{8000} = 4.35$, when taken with reference to the ultimate strength. Although this factor is slightly less than is customary for tension members (for which the factor is about $\frac{46000}{10000} = 4.6$), it seems ample when the fact is considered that the ratio of elastic limit to allowed strain is the true factor of safety in the ordinary use of a structure, and that this ratio will be greater for compression members than for tension members on the basis of above factor. Indeed, for long compression members which fail by flexure as a whole, the ultimate strength is very little removed from the elastic limit, so that the factor of safety with reference to the elastic limit becomes greater as the length of the member increases, assuming the factor of safety with reference to the ultimate or crippling strength to remain constant. Dividing the constants in the above formula by 4.35 we obtain $10{,}600 - 28.5\frac{l}{r}$. For convenience, and as providing additional security for long members, the writer considers it desirable to substitute 30 for 28.5 as the second constant.

## TECHNICAL.

### Locomotive Building.

The Western & Atlantic has ordered several ten-wheel locomotives of the Rhode Island Locomotive Works.

The Cumberland Railway (New Brunswick) has lately received a second new six-wheel locomotive with 18×24 cylinders, made by the Phœnix Foundry.

### Car Notes.

The Laclede Car & Manufacturing Co., of St. Louis, has just delivered four new excursion cars to the Ensley (Alabama) dummy line.

James Harris & Co., of St. John, N. B., have completed a passenger car for the Western Counties Road, which is equipped with the Westinghouse brake and with steam heating apparatus.

Mr. Charles Howard, Superintendent of the Providence & Worcester, has been appointed General Manager of the Burton Stock Car Co.

The Louisville & Nashville has recently awarded a contract to the Missouri Car & Foundry Co., of St. Louis, for 300 drop bottom gondolas and 425 box cars.

### Bridge Notes.

Bids are asked for the building of a new bridge over Long Creek, at Lexington, Ga. Address W. A. Dozier.

The contract has been let to the St. Louis Iron Bridge Co. to build a bridge across the Kee Kee Creek, at Clayton, Mo.

Hoffman & Bates, of Portland, Ore., have been awarded the contract at $3,200 for the construction of a bridge at Tacoma, W. T. Four bids were received.

Proposals are asked by W. B. Webb, until Aug. 1 for constructing a bridge over Rock Creek, near Washington, D. C.

The contract for building a two-span iron bridge at Wever, Ia., has been awarded to James B. Drier & Co., of Keokuk, for $9,435. Each span is to be 180 ft. long, resting upon concrete piers, supported by piles.

The Commissioners of Grant County, Ind., have awarded the contract for the new bridge over the Mississinewa River at Marion, Ind., to the Massillon Bridge Co., of Massillon, O. The contract price is $19,000.

The contract for the superstructure of an iron bridge over the Thames River at Delaware, Ont., has been let to the Hamilton Bridge Co., of Hamilton, Ont., at $13,130.

The following bids were received by the Commissioners for the construction of the bridge over the Colorado River, near Austin, Tex, mentioned in these columns. Milwaukee Bridge & Iron Works, seven bids—$58,185, $57,095, $53,506, $56,900, $53,500, $55,000, $53,303. King Iron Bridge Manufacturing Co., of Cleveland, O.: $44,031, $44,205, $46,723, $47,000. Variety Iron Works: $52,400, $46,000. Missouri Iron Bridge Co., of St. Louis: $54,800, $48,204, $44,130. Smith Bridge Co., of Toledo, O.: $59,000, $60,000 and $56,000. Pennsylvania Bridge Co., of Pittsburgh, Pa.: $52,000, $50,500, $53,500, $55,000. Kansas City Bridge Co.: $56,648, $56,000, $53,000, $52,400. Berlin Bridge Co., of East Berlin, Conn., $51,000. Wrought Iron Bridge Co., of Canton, O., $59,400. Pittsburgh Bridge Co., $54,500. The contract was awarded to the King Iron Bridge & Mfg. Co., for a three truss and double cantilever bridge, at $47,000.

The Penn Bridge Co., of Beaver Falls, Pa., is erecting three bridges for the Newcastle & Shenango Valley.

The iron and steel bridge of the Lake Erie & Western over the Sandusky River, near Fremont, O., was completed this week. It is 1,260 ft. long.

The Oregon Railway & Navigation Company's new iron railroad bridge over the Willamette River, at Portland, Ore., was formally thrown open to traffic July 10.

### Manufacturing and Business.

The Putnam Machine Co., of Fitchburg, Mass., has recently put one of its improved car-wheel borers and a new car axle lathe into the shops of the Pullman's Palace Car Co., at Pullman, Ill.

The Dunham Manufacturing Co., of Boston and Chicago, report a rapidly growing business in their specialties in railroad equipment, and have recently received several trial orders for the Servis tie plate. Since July 1 orders for equipping over 4,000 cars with their freight and stock car door have been received from the following roads: Lehigh Valley; Oregon Railway & Navigation Co.; Boston & Albany; Union Pacific; Wisconsin Central; Canada Atlantic; Chicago, Santa Fe & California; Northern Pacific; Boston & Maine; Ohio, Indiana & Western; Seattle, Lake Shore & Eastern; Intercolonial of Canada; Fitchburg; Keokuk & Western; Atchison, Topeka & Santa Fe, and from the Burton Stock Car Co.

Ryan & McDonald, manufacturers of contractors' supplies at Waterloo, N. Y., lately shipped an order for their rotary dumping cars to Ecuador, to be used in railroad construction in that state.

The Feed-Water Heater Co., of St. Johnsbury, Vt., has recently attached new heaters to locomotives on the Connecticut River and on the Southeastern Division of the Canadian Pacific.

The Aluminum Brass & Bronze Co. has been organized in Connecticut, with a capital of $250,000, for the manufacture of aluminum and the alloys of silicon, under the Cowles patents. At the meeting of stockholders in Waterbury the following officers were elected: F. J. Kingsbury, Sr., President; William Powe, Treasurer, and F. J. Kingsbury, Jr., Secretary. Dr. Waldo will be Electrical Engineer, and Charles S. Moss Mechanical Superintendent. A location for the works has not yet been decided upon. The company controls the exclusive rights, under the Cowles patents, of the alloys of aluminum in sheets, rods and wire. The Sprague Electric Railway & Motor Co. and others are using the silicon bronze wire.

The Columbus (Ohio) Electric Light Co. has just given the Heine Safety Boiler Co. another order for boilers having an aggregate of 500 h. p., thus giving a boiler capacity of 1,000 h. p. of this make used by that company.

The Atlantic & Pacific Equipment Co., of Topeka, Kan., has filed a charter with a capital stock of $2,000,000, to sell or lease locomotives, cars, etc., to railroads. Among the incorporators are John R. Mulvane, of Topeka; Thomas W. Lillie, of New York, and George O. Manchester, of Brookline, Mass.

At a recent meeting of the stockholders of the American Electric Mfg. Co., a new board of directors was elected, and R. N. Hazard, of the American Loan & Trust Co., was chosen President, and F. M. Sowden, Secretary and Treasurer.

J. S. Mundy, Newark, N. J., has recently shipped three of his improved double 8 × 13 cylinder 30 h. p. patent interchangeable friction drum hoisting engines to the Havemeyer & Elder Refining Co. for use on their new pier. These engines are so arranged with castors that they can be screwed from the floor and to wherever work is to be done. He has also shipped a triple drum friction engine to Washington, D. C., to be used by the Maine Granite & Improvement Co. in the construction of the new National Library building. The works have been running on extra time the past three months.

A. Trand, of Newark, N. J., has, among other orders, recently delivered a hoisting engine to the Kings County Elevated road for use at their docks at Fulton Ferry, Brooklyn. He has also shipped another engine to L. V. Treat, New Haven, Conn.

### Iron and Steel.

The Harvey Steel Co., lately organized, is negotiating for the purchase of ground at Jersey City, N. J., upon which to erect works to make steel under the patents of H. A. Harvey, who is known as the inventor of several kinds of machinery. H. A. Harvey is President; Theodore Sturges, of the Oxford Iron & Nail Co., Secretary; B. G. Clarke, of the Thomas Iron Co. and the Lackawanna Coal & Iron Co., Treasurer.

The Cambria Iron Co., of Johnstown, Pa., has recently shipped about 2,000 tons of steel rails for the Alabama Great Southern.

Wm. Swindell & Bros., of Pittsburgh, Pa., have received a contract from the Passaic Rolling Mill Co., of Paterson, N. J., for three of the improved Siemens regenerative furnaces.

The works of the Browne & Sharpe Mfg. Co., Providence, R. I., will be closed between July 30 and Aug. 11, inclusive, for annual repairs, the office remaining open.

The Bethlehem Iron Co., of Bethlehem, Pa., on July 2 made a 150-ton casting, being the base for the steel compressor in the new gun works. This the largest casting known to have been made, and will take three weeks to cool.

### The Rail Market.

*Steel Rails.*—No large transactions are reported, and the market continues dull. Quotations continue at $30 at Eastern mills.

*Old Rails.*—Quotations, $20@$20 50 for tees.

*Rail Fastenings.*—Quotations for spikes, 2@2.05c. delivered; for angle bars, 1.85@1.90c. delivered.

### The Naphtha Launch Engines.

A new motive power has recently been introduced, and is finding much favor for ship's launches, small boats, and similar purposes, where a very compact engine is required. This is the so-called naphtha launch, and a number have already been built, while many more are under construction. In these boats the naphtha is carried in a tank or magazine, usually placed in the bow and separated from the rest of the boat by a tight bulkhead. This bulkhead is perforated so that the water of the sea or river circulates freely around the tank, keeping it cool. From the tank a feed and two exhaust pipes lead to the machinery, which is contained in another water-tight bulkhead. The boiler consists of a series of spiral coils under which is the steam or vapor chest. The engine has three single acting vertical cylinders, the piston rods of which are connected to cranks placed on the shaft at an angle of 120 deg. The naphtha drawn from the tank to the boiler is used for two purposes, an injector feeding a portion of it to a burner or burners placed under the spiral coil which forms the boiler; the rest of it passes into the boiler and is vaporized, and it is this vapor which is used in the cylinders instead of steam. The coil-boiler presents so large a heating surface that the oil is very quickly vaporized. In some of the boats a pressure of 60 lbs. has been attained in two or three minutes after the burners have been lighted. The makers of this engine claim that 6 per cent. of the naphtha only is required for fuel.

After passing through the cylinders the vapor or exhaust is condensed in the exhaust pipes, which are carried under the bottom of the boat, and returns to the reservoir again as a liquid, the loss being comparatively small. The supply is regulated by valves, and is kept up by an air-pump. To start the engine, all that is necessary is to start this air-pump by hand, light the burners, and a very few strokes of the pump will give a sufficient supply to heat the boiler and vaporize the naphtha.

It is claimed that this power is very cheap; its economy is not fully established, but the small space required for the machinery, and the ease with which the engine can be regulated, present so many points in its favor, for the purpose in which it has been used, that economy is a minor consideration. The naphtha engine can be applied to many small boats and launches where a steam-engine and boiler would take entirely too much room. A very similar device has also been introduced in England, where it is known as the "petroleum spirit engine." The arrangement in these differs somewhat from those so far adopted in this country, but the general principle is the same.

### New Equipment for Northwestern Railroads.

Below is a list of the new rolling stock, etc., ordered or being ordered by the St. Paul and Minneapolis companies, as reported by the *Northwestern Railroader*, during the half year just closing, making a total of 234 locomotives and over 10,000 cars:

Minn., St. Paul & Sault Ste. Marie:
- 500 box, 50,000 lbs., Pullman Co.
- 500 box, 50,000 lbs., Wells & French Co., Chicago, Ill.
- 8 mogul freight engines, Rhode Island Locomotive Works, Providence, R. I.
- 20 sleeping cars, Barney & Smith, Dayton, O.
- 25 postal, express and day coaches, Ohio Falls Car Works, Jeffersonville, Ind.
- 13 ballast unloaders, Marion Steam Shovel Co., Marion, O.

Duluth, So. Shore & Atlantic:
- 30 locomotives, Jackson Car Co., Jackson, Mich.
- 20 coaches, Jackson Car Co., Jackson, Mich.
- 6 baggage cars, Jackson Car Co., Jackson, Mich.
- 4 comb. mail and express, Jackson Car Co., Jackson, Mich.
- 40 cabooses, La Fayette Car Co., La Fayette, Ind.
- 10 ore cabooses, La Fayette Car Co., La Fayette, Ind.
- 500 box cars, La Fayette Car Co., La Fayette, Ind.
- 750 ore cars, La Fayette Car Co., La Fayette, Ind.

Eastern Railway of Minnesota:
- 1,250 box cars, Haskell & Barker, Michigan City, Ind.
- 18 locomotives, Rogers Loco. Works, Paterson, N. J.

St. Paul, Minneapolis & Manitoba:
- 3 ditchers, Marion Steel Shovel Co., Marion, O.
- 31 locomotives, Rogers Loco. Works, Paterson, N. J.
- 15 coaches, Barney & Smith, Dayton, O.
- 6 sleeping cars, Barney & Smith, Dayton, O.
- 6 dining cars, Barney & Smith, Dayton, O.
- 8 colonist sleepers, Barney & Smith, Dayton, O.
- 900 box cars, Haskell & Barker, Michigan City, Ind.

Chicago, St. Paul, Minneapolis & Omaha:
- 1,000 freight, La Fayette Car Co. and Peninsular Car Co., Detroit, Mich.
- 6 coaches, Pullman Car Co., Pullman, Ill.
- 26 locomotives, Schenectady Locomotive Works, Schenectady, N. Y.
- 1 wrecking car, Bucyrus Foundry & Manufacturing Co., Bucyrus, O.

St. Paul & Duluth:
- 3 locomotives, New York Locomotive Works, Rome, N. Y.
- 4 coaches, Barney & Smith, Dayton, O.
- 6 reclining seat cars, Barney & Smith, Dayton, O.
- 2 comb. smoking and baggage cars, Barney & Smith, Dayton, O.
- 2 sleeping cars, Pullman Car Co., Pullman, Ill.

Chicago, St. Paul & Kansas City:
- 4 passenger locomotives, Cooke Locomotive Works, Paterson, N. J.
- 25 mogul freight locomotives, Cooke Locomotive Works, Paterson, N. J.
- 5 mogul freight locomotives, Rhode Island Locomotive Works, Providence, R. I.
- 5 passenger locomotives, Rhode Island Locomotive Works, Providence, R. I.

Northern Pacific (1888 delivery):
- 1,000 box cars, Peninsular Car Co., Detroit, Mich.
- 4 rotary snow plows, Rotary Steam Shovel Mfg. Co., Paterson, N. J.

Chicago, Burlington & Northern:
- 1,000 box cars, La Fayette Car Works, La Fayette, Ind.
- 10 way cars, Ohio Falls Car Co., Jeffersonville, Ind.

Equipment Co. orders (1888 delivery):
- 50 heavy freight locomotives.
- 500 stock cars.
- 500 coal cars.
- 10 first-class coaches.
- 6 combined baggage and mail.
- 50 furniture cars.

Equipment Co. orders (1889 delivery):
- 1,000 box cars.
- 25 freight locomotives.
- 500 coal cars.

### Steamship for the Southern Pacific Co.

Cramp & Sons, in Philadelphia, have taken a contract for a new steamship for the Southern Pacific Co., which is to be 338 ft. long, 42 ft. 8 in. beam and 31 ft. 8 in. depth of hold, with a gross tonnage of 3,531 tons. She will have triple-expansion engines and be fitted with all improvements in ship building of the present time. Orders for materials will be given out at once.

### Columbia River Boat Railroad.

In view of the introduction into the United States Senate of a bill appropriating half a million dollars for the construction of this railroad the *Northwestern Railroader* publishes a report made in 1885 by Maj. W. A. Jones, Corps of Engineers, U. S. A., giving estimates of the cost of boat transfer roads around the Dalles and Celilo Falls. The length of track for Celilo Falls is estimated at 4,500 ft., and the cost of track, car and machinery at $356,000. The estimated cost of the Dalles transfer is $662,000 for 9,000 ft. of track. To make these portages available it was estimated that $355,000 must be spent in rock excavation from the channel at other points, making a total expenditure of $1,373,000. The following is a brief description of the car and track proposed by Major Jones:

"The maximum grade of the track is 213.84 ft. per mile. The summit is passed by a gentle curve, quite within the limits of longitudinal flexure that will result from passing over the summit curve. The car is made up of cross girders supported by longitudinal built beams, which in turn are carried by the wheel-axles, the whole suitably braced, and having sufficient iron introduced to prevent floating when completely submerged. It will be handled by cables from the stationary engine at the summit. It will have twenty-one wheels on each side, with independent axles, forty-two in all, running on a two-rail track 25 ft. 6 in. wide. The maximum load on a single wheel will be about 17 tons. Length and width over all, 190 ft. and 48 ft., respectively. For the present only a single line of track is proposed. Should the traffic develop a necessity for it another can be laid alongside."

### Economy of High Pressure Steam Jackets.

According to the *Revue Industrielle*, M. P. Guzzi, an Italian engineer, has recently introduced a system of constructing steam engines in which the jacket is supplied with steam of a higher pressure than that used inside the cylinder. The high pressure steam is generated by a small boiler constructed on Perkins' system, which is placed inside the furnace of the main boiler. In this way steam is obtained at a pressure of about 220 lbs. per sq. in., with a corresponding temperature of about 390 deg. Fahr., and with this steam the jackets are

supplied, and when condensed in these it drains back into the boiler. By this arrangement the initial condensation in the cylinder is materially reduced, with a corresponding improvement in the efficiency of the motor, as the following figures, taken from an engine when working as described above, and when working under normal conditions, show:

| | Jacket using steam at a pressure of 176 lbs per sq. in. | Jacket working under normal conditions. |
|---|---|---|
| Duration of test..... | 6 hrs. 18 min. | 7 hrs. 11 min. |
| Mean effective pressure in main boiler..... .. .....56.6 lbs. per sq. in. | | 56.2 lbs. per sq. in. |
| Mean indicated horse-power..... ..... | 25.9 | 25.67 |
| Consumption of water per I. H. P. per hour... .... | 19.6 lbs. | 23.5 lbs. |

This engine has now been working for about eighteen months, but in other cases, to avoid the risk arising from high pressure steam, it has been proposed to substitute for steam the vapor of linseed oil, which boils under atmospheric pressure at about 700 deg. Fahr.

### Sheet Iron Bands for Locomotive Boiler Lagging.

It is the general practice to allow the lagging of a locomotive boiler to rest on wooden bands, strapped tightly around the barrel of the boiler. These bands often give considerable trouble by being burned, and sometimes are the cause of the destruction of the whole lagging. To overcome this difficulty Mr. J. H. Vreeland, Master Mechanic of the Eastern Division of the New York, Lake Erie & Western, hit upon an excellent device of making the bands of channel iron section resting on the plates, clamped to the boiler, and thus presenting a smooth flat surface, on which the lagging is allowed to rest.

It is claimed that the expense of making and putting these iron bands on the boiler is less than that of wooden ones. They are made of the iron used for the jacket, and may be made from the iron jackets taken off old engines. Strips of sheet iron are cut, whose width is such as to make the band, when finished, about one to one and a half inches wide, with flanges of sufficient depth to raise the outer surface of the bands above the rivet heads. These strips are then very easily and quickly rolled to the form of channel iron, and curved to suit the diameter of the barrel. In order to allow for the difference of the outside and inside diameters of the bands, the flanges are somewhat crimped in rolling, but this in nowise detracts from the usefulness of the band. These bands have been in use for about six or seven years, giving great satisfaction. While the use of iron bands is not entirely new, they confer several advantages, being more durable than wooden bands, and not only is the danger of setting fire to the bands averted, but they will hold a portion of the lagging in position after a portion has been burned. Experience has demonstrated the fact that, with the use of iron bands, the lagging will last longer, and gives less trouble, than when the old-fashioned wooden ones are used.

### A Long Tangent.

The Argentine-Pacific Railroad from Buenos Ayres to the foot of the Andes has one tangent of 211 miles, and in this distance there is not a single bridge and no opening larger than an ordinary culvert. The level nature of the country will be appreciated from the statement of the further fact that on the 211 miles there is no cut greater than one metre in depth and no fill of a height exceeding one metre. The country, in fact, seems to be almost an ideal one for railroad construction. There are some drawbacks, however, one being that there is almost an entire absence of wood on the plain across which the western end of the road is located. This has led to the extensive use of metallic ties, which will be used on nearly the entire road. Work has already been begun on the mountain section of the road, which is to cross the Andes and unite with the Chilian line.—*Exchange.*

### Speed of Trains.

An examination of the *Official Guide* for June shows that the fastest trains now on the time-tables are two on the Baltimore & Ohio, which are timed to run the 40 miles from Baltimore to Washington in 45 minutes, without stops, making the rate of speed 53.3 miles an hour. [It is stated, however, that these trains rarely succeed in making the trip in the time allowed.] No other train can be found which makes over 50 miles an hour, and the nearest approach to it is a train on the Pennsylvania, which runs from Jersey City to Philadelphia, making one stop, at an average speed of 48.3 miles an hour. On the opposition—the Bound Brook—line one train makes the distance from Jersey City to Philadelphia at the rate of 45.9 miles an hour, without allowance for the four stops. The quickest train between Philadelphia and Baltimore runs at the rate of 41.6 miles an hour.

The fastest long-distance run is that of the Chicago Limited on the New York Central & Hudson River, which averages 41.6 miles an hour from New York to Albany, and 40.6 miles from Albany to Buffalo. The corresponding train on the Pennsylvania road runs at the rate of 38 miles an hour from Philadelphia to Pittsburgh.

The trains which are timed to run over 40 miles an hour are thus found to be very few in number, and there are not many which are called upon to make more than 35 or indeed over 30 miles for any considerable distance. It must be remembered, however, that a train whose average speed is 40 miles an hour must make much faster time than that in parts of its run.

What is the slowest passenger train in the *Guide* is not easy to determine, but an "express" on a North Carolina line which takes 9 hours to run 100 miles—an average of 11.1 miles an hour—is a very promising candidate for the honor.—*Railroad and Engineering Journal.*

## THE SCRAP HEAP.

### A Cable Road Collision.

A grip car, beyond control and running at the rate of eight miles per hour through the business part of the city, caused a lively scene in Chicago one night last week. The result was three badly wrecked cars, many badly frightened women and children, and some severe contusions, but no fatalities. As a Clark street car came out of the tunnel on La Salle going south, the driver applied the brakes, but without effect, as a strand of cable had wound itself around the grip, and the grip would not release. Just ahead of this was a Wells street train filled with passengers. At Monroe street the Wells street train was struck and thrown in a heap into the gutter. Two blocks further on the moving train struck the curve at Dearborn street. Here the cars became disengaged from the strand, and ended their mad progress career by jumping the track.

### A Color-Blind Test.

The following suggestion of a mean and underhanded trick for tripping up color-blind persons who wish to appear normal-eyed, is made by Burdette in the *Pathfinder:*

"They're havin' a red hot time over the color test on the ——— road," said the fireman, "lots of the boys laid off; can't tell a green light from white." "Yes," replied the engineer, "they get paid so seldom, that by the time a greenback reaches 'em it's gray with old age, so they naturally get their ideas of color mixed."

### Train Collectors—A Western Parable.

The Chicago, Milwaukee & St. Paul has recently put collectors on its passenger trains. A local paper says.

"The innovation is not new. Neither is it inaugurated so much with a view to safety of trains as to certainty of earnings. It is an absolute impossibility for a conductor to take up fares upon the crowded local suburban trains, and it is not impossible for friends of conductors to be conveniently overlooked upon the through trains. An old conductor who is now upon the Central road enjoyed the assistance of one of those collectors upon a Michigan line some years ago. He had covered that particular run for years. Among his friends was a traveling man who wasn't in the habit of paying. The first trip he made under the new plan the conductor told him the collector was on and together they explained to the collector the courtesies previously extended. The assistant was obdurate, but finally allowed that in consideration of the conductor's friendship he would accept half fare. The passenger started to pay it when the conductor interfered: "Keep your money. The collector has knocked off one-half and I will the other."

The train collectors on the Atchison, Topeka & Santa Fe, which it was rumored were to be taken off, are still running.

### Rhine Steamers.

Owing to the low stage of water in the Rhine, particularly in the last three months of 1887, the Lower Rhine Steamer Company finds its receipts considerably reduced, while the expenditures were increased proportionately. The company, however, will build a new flat bottomed paddle tug with a three cylinder engine for service during the coming autumn.

### Alliterative Politics.

Mr. Depew's three R's—The N. Y. C. & H. R. R. R.—may be held responsible for his still being President.—*Puck.*

### The Vestibule Law Suits.

In the United States Circuit Court at Chicago last week, Judges Gresham and Blodgett granted the motion of the Wagner Palace Car Co. to modify the preliminary injunction issued last month in the Vestibuled Car case between the Wagner and the Pullman companies. The effect of the decision is that the injunction is dissolved, and the Wagner Co. is at liberty to use the vestibule platforms as originally constructed. By this action all proceedings in the litigation are stopped until the matter can come up for trial in the regular way, which will probably not be for over a year. In the meantime the Wagner Co. gives bonds.

### Fast Freight.

The Pennsylvania reports that it has hauled a train of live stock from Chicago to Philadelphia in 37 hours and 20 minutes. This is about 22 miles an hour.

### Castor Oil as a Lubricant.

The Italian Admiralty has recently carried out a series of experiments to test the respective worth of olive and castor oil for lubricating purposes in the Italian navy, and we understand it is decided that henceforth all the exposed parts of machinery are to be lubricated exclusively with castor oil. For the internal parts of the machines mineral oil will be used, and where olive oil is exceptionally employed the engineer must register the fact, and his reason for using it.

### The Most Powerful Light in the World.

The arc lamp in the St. Catharine's Lighthouse, on the Isle of Wight, is said to be the most powerful electric light in the world, and equal to 60,000 candles. The carbon pencils have a diameter of 2½ in., and the electric arc bridges a space of about ½ in. between the carbon points. The lamp is of the Serrin-Berjot type, and the dynamos by De Meritens, of Paris, while the engines to drive them are of the compound type, by Robey & Co., of Lincoln.

### The English Race.

At present the populations either speaking the English language or under the domination of English-speaking peoples number more than 318,298,000, or one-fourth of the population of the globe. The English-speaking races occupy one-fourth of the dry land of the earth, and own nearly two-thirds of the tonnage of the ships.

### It Ought to Work both Ways.

The Minnesota Business Men's Association has held a meeting and declared for a universal mileage ticket which shall be sold at the rate of two cents per mile. No doubt this would be a good thing for the universal traveling men, but it would be neither profitable nor pleasant for the railroads of the country. If the railroad men should get together and resolve in favor of a reduction in prices of dry goods and groceries would the Minnesota Business Men's Association make haste to grant the request?—*Railway Age.*

### The Nile Flood of 1887.

*Indian Engineering* states that Sir Colin Scott Moncrieff has prepared notes in reference to the Nile flood of 1887, which was not so high as that either of 1874 or 1878, but still may be classed as one of quite exceptional magnitude. Sir Colin says: "When face to face with inundation we naturally looked for records of previous floods. It would have been invaluable to us to have known where were found the weakest points, what measures were found effective and what ineffective. But even of these two great floods within the last 13 years not an engineering record was forthcoming any more than if they had occurred in the reign of a Pharaoh."

Sir Colin and *Indian Engineering* should remember that within a very few years an English officer inaugurated a new era in Egyptian engineering by destroying the records which had been accumulated before his time. Records of previous floods had long been kept, and it is possible that they were destroyed with the other "rubbish" which this officer found at the citadel.

### Strikes.

The switchmen of the Chicago, Burlington & Quincy at Kansas City struck this week because of a cutting down of men in the crews, which, they said, was a violation of an agreement. The officers deny that they have broken an agreement. The men were given a few hours in which to return to work. Business in the yard is practically at a standstill.

The newspapers have printed numerous dispatches the past week to the effect that a strike of engineers was imminent on the East Tennessee, Virginia & Georgia road. Chief Arthur went to Knoxville and it was reported that he had given his consent to strike; but the latest accounts state that the men voted to remain at work. The cause of the disturbance is thus related by a member of the brotherhood:

"Monahan, the engineer whom we want reinstated, went to the Superintendent's office as the chairman of the Grievance Committee of his division of the brotherhood, to see and confer with that official about the equity of the discharge of another engineer, which had been made upon the ground that the engineer discharged was to be blamed for a tail-end collision. Mr. Monahan went into Train Master Garrett's office to ask about Superintendent Huger. He was told the latter was out of town, and he proceeded to tell Garrett of the purport of his mission and who he was. Garrett in reply told Monahan that he had no business in the train master's office, but that his place was on his engine, and when not there, at home. Monahan remonstrated with him but all to no avail, and finally Garrett ordered Monahan out of his office, saying if he did not get out he would either put him out or have him put out. This riled Monahan and he talked to Garrett for awhile with the bark on."

### For Harbor Improvement.

The Inter-state Deep Water Convention was permanently organized at Fort Worth July 11. The Committee on Resolutions, after reciting the importance of a Texas port, suggested that the delegates request their representatives in Congress to ask of the Federal Government an appropriation of at least $5,000,000 to secure a deep water port on the coast of Texas. The convention indorsed any effort of private enterprise to secure deep water on the Texas coast, and pledged itself to use its influence to induce the general government to reimburse the outlay when 20 ft. of water shall have been procured. The resolutions asks the Congressmen of the states interested to secure the appointment of a Board of Government Engineers to report upon the most available point for a deep-water port on the Texas coast. Another inter-state deep-water convention was agreed upon, to be held in the city of Denver not later than Sept. 15. The report of the committee was adopted and the convention adjourned *sine die.*

### Celluloid for T-squares, Triangles, etc.

At the offices of Messrs. E. P. Allis & Co., in Milwaukee, some of the members of the American Society of Civil Engineers were shown some T-squares triangles and curves made of celluliod. This application of celluloid is patented, we believe, by Mr. H. W. Hubbard, who intends to come to New York to make and sell the instruments. Those which were shown in Milwaukee were very attractive to look at and handle. The finish was finer than any wood is capable of receiving; the instruments were more elastic than those made of hard rubber, and they were very transparent; that is, they were more transparent than tracing cloth. All of these qualities, and especially the latter, make these celluloid instruments handsome and convenient, and unless there is some objection to them which does not appear at first sight, they will be popular with draughtsmen.

### The Poppy as a Bank Protector.

The *Manufacturers' Record*, in an article recommending opium culture in the South, says that once sown the poppy is self-perpetuating, and is, in fact, hard to exterminate, reciting the fact that within the last two or three years eminent French engineers have undertaken the sowing of railroad embankments with poppy seeds, as, when once established, that prolific plant would cover the soil with a network of roots that would prevent it from washing away during heavy rains or from upheaval when frost was coming out of the ground in the spring.

The suggestion seems good enough to warrant a trial. Surely a bank of poppies would present advantages in an æsthetic point of view over a bank of pig-weed, thistles and tomato cans.

### Land Grant Decision.

A Washington dispatch of July 11 says: "The Secretary of the Interior has made an important decision as to the rights of pre-emption claimants within the granted limits of land-grant roads. The decision in effect is that an unexpired pre-emption filing within the granted limits prior to the definite location of the line of the road is good in the person filing the claim against the road. In other words, incompleted pre empted entries are good within the limits of grant, if made prior to the definite location of the road. This decision arose in the case of William H. Malone vs. The Union Pacific. The principle established will, it is said, cover considerable land within the granted limit of all roads. The amount of land involved is said to be 15,000,000 acres."

## RAILROAD LAW—NOTES OF DECISIONS.

### Powers, Liabilities and Regulation of Railroads.

A Texas statute provides that no mortgage of a railroad company shall be valid unless authorized by resolution adopted by a vote of two-thirds of all the stock of such company. The Supreme Court rules that nevertheless where, in pursuance of a resolution to issue bonds secured on mortgage not so adopted, a contract has been executed and the company has had the benefit thereof, it is estopped from denying its authority to make the contract.[1] The Court also holds in this case that where a person conveys a railroad to a corporation and agrees to accept, as part of the purchase money, bonds secured by mortgage on the line, plaintiff is entitled, the bonds having never been given, to recover the full par value of the bonds, though they might be below par in the market.

In Alabama the Supreme Court decides that under a charter authorizing a railroad company to obtain by grant from cities or villages any rights, privileges, or franchises in reference to the construction, maintenance, and management of its cars, locomotives, and its business, a grant by a city to such railroad of the right to build a track along a business street is a franchise within the meaning of the charter, and, as such, is irrevocable, such grant having been made before the Constitution of 1875, prohibiting irrevocable grants of special privileges, went into effect. Where a city granted to a railroad company the right to lay a track, with the necessary sidings and turn-outs along a business street, in such manner as the company might deem expedient and necessary for its business and interests, and the company, having laid such tracks, had for eighteen years loaded and unloaded its cars on said street, the city cannot deprive the company of the right thus to load and unload them in the future, and if it attempts to do so equity will interfere by injunction.[2]

In Michigan the Supreme Court holds that a conveyance by the state to a railroad of more lands than the road had at that time earned is not a grant subject to forfeiture but void, even though the road subsequently earned them.[3]

In Iowa the Supreme Court holds that under the statute creating a railroad and warehouse commission, the determination of said commission as to what are equal and reasonable fares and rates for the transportation of persons and property by a railway company is conclusive, and in proceedings by *mandamus* to compel compliance with the tariff of rates recommended and published by them, no issue can be raised or inquiry had on that question.[4]

In Texas it is held by the Supreme Court that the statute of 1887 providing for the construction of crossings along the line of railroads which requires a railroad company to make, at its own expense, "farm crossings" within the inclosure of private individuals and across its tracks, is unconstitutional in so far as it applies to companies that have, before the passage of the act, secured an unconditional right of way over the land, and fenced its track; the expense of making and maintaining all necessary private crossings having been included in the compensation paid for the right of way.[5]

In the same state, in an action against a railroad company

to foreclose an equitable mortgage, it appeared that plaintiff's intestate conveyed a certain line of railroad property to defendant, the purchase money to be secured by mortgage upon the line conveyed, and "upon such proposed extensions as the company owning and operating the same may elect to include in such mortgage." At a stockholders' meeting it was voted to issue bonds of the same character as those sued on, to be secured on all the property, etc., of the company from H. to P., both constructed and to be constructed, which included the only extension made by the company. The Supreme Court holds that plaintiff's equitable mortgage extended to the part of the line subsequently constructed.[6]

An Ohio statute (Rev. Stat., Sec. 3,333) imposes upon railroad companies, the tracks of whose roads cross each other at a common grade, the joint duty and obligation of making and keeping in repair the crossing and maintaining watchmen thereat; and requires the expense thereof to be borne by the companies jointly. The Supreme Court rules that where either of them performs the whole duty and pays the whole expense, it is entitled to recover from the other its equal portion thereof.[7]

### Carriage of Goods and Injuries to Property.

In Texas the Supreme Court rules that a person who has sold a large number of excursion tickets to a third person, is entitled to recover damages for the failure of the railroad company to comply with its contract to convey an unlimited number of excursionists for a certain fare. He is entitled to the net profits on all tickets he would have sold.[8]

A Mississippi statute providing a privilege tax to be paid by the persons exercising the privileges enumerated, with a punishment against those unlicensed, declares that "all contracts made with any person who shall violate this act * * * shall be null and void so far only as such person may base any claim upon them, and no suit shall be maintainable in favor of such person on any such contract."

The Supreme Court rules that the assignee for value of a bill of lading may maintain an action on the contract in the bill made between his assignee and the carrier, whether the privilege tax has been paid or not.[9]

In Dakota, the household goods of the plaintiff, which had arrived by rail, were left in the railroad warehouse on their arrival. Nothing was said between the parties as to payment for storage, although plaintiff expected to pay something, and told the defendant's agent that it would be an accommodation, and would save him drayage. Before they were removed the warehouse was accidentally destroyed by fire and they were consumed. The Supreme Court holds that the defendants were gratuitous bailees, and not responsible for the loss.[10]

### Injuries to Passengers, Employes and Strangers.

In Texas an engineer who had been injured in an accident applied to the general manager of the road for pecuniary aid, stating that he had no intention to sue for damages. He was promised, in substance, that the railroad would give him such help as he and his family might need and would see him through until he was sound; and was paid several sums of money and had his physician's bills paid. Subsequently he asked railroad for an agreement in writing to take care of him, stating that the time would soon expire in which he could sue. This the railroad refused, saying that what had been done for him was out of sympathy, that it recognized no legal liability and he might sue if he wanted to. Before he had recovered, plaintiff instituted suit for damages on account of the injuries, and the jury gave him a verdict for $40,000. The Supreme Court holds that his agreement or the acceptance of the aid did not prevent his right to sue, but reverses the verdict because it is excessive.[11]

In Iowa a brakeman was injured by falling from some machinery which was in an open car, over which he had to pass. The Supreme Court decrees that in not providing foot boards over the car the company was negligent, and is liable in damages, also that the plaintiff did not assume this risk. In this case, obeying an unusual signal from the engineer to set the brakes, he necessarily attempted a passage, which he knew to be dangerous, over an intervening car, which the conductor had told him he need not go over, and which it would have been unnecessary for him to pass over if the brake on another car had been in working order, and fell and was injured. The Supreme Court holds that his knowledge of the danger of his attempt ought not to defeat his recovery, since it was his duty to obey orders.[12]

In Indiana a person drove on the track at a crossing at a high speed and without looking out. He was run into and killed. The Supreme Court rules that his negligence bars a recovery.[13]

In New York the plaintiff and a companion engaged in a common employment, riding in a wagon driven by plaintiff's companion, upon a street in which were railroad tracks used by trains drawn by dummy engines, drove upon a track on which a train might be expected soon to approach (plaintiff and his companion being familiar with the street and the running of trains thereon), and the wagon came in collision with an approaching train and plaintiff was injured. The Court of Appeals rules that both were negligent, and the plaintiff cannot recover damages.[14]

In New Hampshire the engineer blew the whistle so violently at a crossing as to frighten the horse of a traveler, make him run away and do injury. The jury found a verdict against the railroad, which is affirmed by the Supreme Court.[15]

In Kansas the Supreme Court rules that it is negligence *per se* for the railroad to fail to sound the whistle 80 rods from a public crossing, but it does not excuse a traveler from using care and caution to avoid injury at such crossing.[16]

[1] Tex. W. R Co. v. Gentry, 8 S. W. Rep., 98.
[2] Mobile v. L. & N. R. Co., 4 South. Re., 106.
[3] Jackson, L. & S. R. Co. v. Davison, 37 N. W. Rep., 537.
[4] State v. C., M. & St. P. R. Co., 37 N. W. Rep., 782.
[5] S. C. & S. F. R. Co. v. Rowland, 7 S. W. Rep., 718.
[6] Tex. W. R. Co. v. Gentry, 8 S. W. Rep., 98
[7] B. & O. R. Co. v. Walker, 14 West. Rep., 172.
[8] H. & T. C. R. Co. v. Hill, 7 S. W. Rep., 659.
[9] Peoples Bk. v. A. G. S. R. Co., 4 South. Rep., 115.
[10] Whiting v. C., M. & St. P. R. Co., 37 N. W. Rep., 222
[11] S. C. & S. F. R. Co. v. Gordon, 7 S. W. Rep., 695.
[12] Hosie v. C., R. I. & P. R. Co., 37 N. W. Rep., 963.
[13] Cones v. C., I., St. L. & C. R. Co., 14 West. Rep., 101.
[14] Donnelly v. B. C. R. Co., 11 Cent. Rep., 875.
[15] Walker v. B. & M. R. Co., 6 N. Eng. Rep., 199.
[16] A., T. & S. F. R. Co. v. Townsend, 17 Pac. Rep., 804.

# General Railroad News.

## MEETINGS AND ANNOUNCEMENTS.

### Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

*Atlanta & West Point*, 3 per cent, payable July 14.

*Huntington & Broad Top Mountain*, 1¼ per cent. on the preferred stock, payable July 23, to stockholders of record July 14.

*Mine Hill & Schuylkill Haven*, 2 per cent., payable July 14.

*New Castle & Beaver*, quarterly, 2½ per cent., payable July 3.

*New London Northern*, quarterly, 1¾ per cent., payable July 2.

*Paterson & Ramapo*, 4 per cent., payable July 3.

*Portsmouth & Dover*, 3 per cent., semi-annual.

*Wilmington, Columbia & Augusta*, 3 per cent., payable July 10.

*Wilmington & Weldon*, 4 per cent., payable July 15.

### Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

*Atlanta & West Point*, annual meeting, Atlanta, Ga., Aug. 5.

*Duluth, South Shore & Atlantic*, annual meeting, Marquette, Mich., July 19.

*Evansville & Terre Haute*, special meeting, Evansville, Ind., July 21.

*Marquette, Houghton & Ontonagon*, annual meeting, Marquette, Mich., July 19.

*North Carolina*, annual meeting, Greensboro. N. C. July 12.

*Toledo & Ohio Central*, special meeting, Toledo, O., July 14.

### Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

*The Railroad Accounting Officers* will meet at the Hotel Brunswick, New York City, July 25, to organize a permanent association.

The *National Association of General Passenger and Ticket Agents* will hold its fall meeting in Saratoga, N. Y., Sept. 18.

The *National Association of General Baggage Agents* will hold its next meeting in New York City July 18.

The *Roadmasters' Association of America* will hold its next convention at Washington, D. C., Sept. 11.

The *New England Roadmasters' Association* will hold its sixth annual convention at Boston, Mass., Aug. 15-16.

The *American Association of Railway Chemists* will hold its next meeting in Baltimore, Md., in October.

The *New England Railroad Club* meets at its rooms in the Boston & Albany passenger station, Boston, on the second Wednesday of each month.

The *New York Railroad Club* meets at its rooms, 113 Liberty street, New York City, on the third Thursday of each month.

The *Western Railway Club* will hold its next meeting on the third Wednesday in September, at the Grand Pacific Hotel in Chicago.

The *Central Railway Club* meets at the Tifft House, Buffalo, the fourth Wednesday of January, March, May, August and October.

The *American Society of Civil Engineers* holds meetings on the first and third Wednesday in each month at the House of the Society, 127 East Twenty-third street, N. Y.

The *Boston Society of Civil Engineers* holds its next regular meetings at its rooms in the Boston & Albany station, Boston, at 7:30 p. m. on the third Wednesday of September.

The *Western Society of Engineers* holds its regular meetings at its hall, No. 15 Washington street, Chicago, at 7:30 p. m., on the first Tuesday of each month.

The *Engineers' Club of Philadelphia* will hold its next meeting in Philadelphia, Oct. 6.

*The Engineers' Society of Western Pennsylvania* will hold its next meeting in Pittsburgh, Sept. 18.

*The Engineer's Club of Kansas City* will hold its next regular meeting Sept. 3.

## PERSONAL.

—Col. Thomas L. Casey has been nominated by the President to be Chief of the Corps of Engineers, U. S. A., to succeed Gen. Duane, retired.

—H. C. Ives, who tendered his resignation some time ago as Assistant General Manager of the St. Paul, Minneapolis & Manitoba, has withdrawn it at the earnest solicitation of the officers of the road.

—Theodore D. Kline, who has been Superintendent of the Southwestern Division of the Central of Georgia for four years, has resigned to accept a position on a Western road. He has been Superintendent on several Southern roads, and previous to his connection with the Central of Georgia was Superintendent of the Georgia Division of the East Tennessee, Virginia & Georgia.

—The Hon. John J. Adam died at his home in Tecumseh, Mich., July 4, aged 81 years. He was a native of Scotland, and was promiuently connected with the history of Michigan, and held several important positions. In 1853 he became connected with the Lake Shore & Michigan Southern, and when the line was completed through to Chicago was appointed Auditor of the company, which position he held until 1868.

—Robert Hale, Secretary of the Minneapolis Board of Trade, died in that city, June 28, at the age of 73. Mr. Hale held the position of Superintendent and other similar places on various railroads in New England years ago. For seven years following 1864 he was General Superintendent of the Chicago & Alton and after that held the same office on the Missouri Pacific, which road he left on account of ill health. He had been engaged in manufacturing interests for the past 15 years.

—Mr. James Harris, the founder of the car and machine works of James Harris & Co., of St. John, N. B., died at his residence in that city a few days since at the advanced age of 85 years. Mr. Harris was born in Annapolis, Nova Scotia, in 1803, but came to St. John when a young man. In 1831 he, with associates, laid the corner-stone of the extensive car works, foundry and rolling mills, over which he presided almost to the day of his death, achieving a remarkable success. Mr. Harris was a man of wonderful energy and unshaken integrity, and his loss will be keenly felt by the community.

## ELECTIONS AND APPOINTMENTS.

*Atlantic, Tennessee & Ohio.*—The following officers and directors were elected at the annual meeting in Charlotte, N. C.: President, William R. Myers; Secretary and Treasurer, John J. Gormley. Directors: William R. Myers, John H. McAden, M. M. Orr, E. B. Springs, C. A. Carlton, E. B. Drake and J. H. Reid.

*Bowling Green & Northern.*—The company has organized with the following directors: J. M. Wilkinson, J. Proctor Knott, Hunter Wood, C. G. Smallhouse, Hugh Barclay, C. U. McElroy, Mr. H. Crump, J. D. Hines and Wm. Matthews. J. W. Gaines is President and N. Clark Secretary.

*Canadian Pacific.*—F. P. Brady has been appointed Assistant Superintendent of the Atlantic Section, west of Sherbrooke, with office at Farnham.

*Canaveral & South Florida.*—The following officers have been elected: N. N. Penny, President; W. C. Wesson, Vice-President; Henry H. Harrison, Secretary and Treasurer, and Robert Ransom, Canaveral, Fla., Chief Engineer.

*Chesapeake & Nashville.*—At the annual meeting in Covington, Ky., last week, the following directors were elected: I. E. Gates, R. T. Colburn, E. H. Pardee, F. H. Davis, Robert Meek, H. E. Huntington, Eugene Zimmerman, G. Brashears and A. Evans.

*Chicago, Mattoon & Cairo.*—The incorporators are T. A. Allen, Frank Kern, John W. Stubbins, James H. Carr, J. C. Clenn, J. W. Shrader and John F. Scott, all of Mattoon, Ill.

*Chicago, St. Louis, Kansas City & Galveston.*—The incorporators of this new Illinois company are: Robert D. Fowler, Francis E. Hinckley, E. F. House, E. M. Fudge and Joseph Lathrop, all of Chicago.

*Chowan & Southern.*—George S. Scott, President of the Richmond & Danville, has been elected President, vice G. M. Serpell, who is made General Manager.

*Cleveland, Columbus, Cincinnati & Indianapolis.*—C. H. Paddock has been appointed Commercial Agent, with office at Dallas, Tex.

*Dayton & Faunsdale.*—The following officers and board of directors were elected at a meeting of the stockholders of this Alabama road last week: R. W. Price, President; J. H. Minge, Vice-President; H. W. Morgan, Secretary and Treasurer; G. W. Taylor, Attorney. Directors: J. J. King, J. F. Watkins, J. H. Minge, A. H. Archer, G. L. Siddons, R. W. Price, W. W. Bruce, J. C. Brown and C. H. Askew.

*Florida Central & Peninsular.*—The following are the directors of this company, which is a reorganization of the Florida Railway & Navigation Co.: William Bayard Cutting, H. R. Duval, Frederick W. Foote, Edwin N. Dickerson, Adolph Engler, Wayne MacVeagh, J. H. Thomas, D. F. Maxwell and John A. Henderson.

*Freehold & New York.*—The annual meeting was held last week, and the following directors were elected: J. S. Schultze, George Hunter Brown, New York; Justus E. Ralph, William R. Schultz, William H. Vredenburgh, Theodore W. Morris, Stacy P. Conover, Daniel P. Van Doven, Samuel I. Wright, H. B. Willetts, H. R. Laine and Joseph D. Hoff.

*Huntington & Guyandotte River.*—The stockholders have organized by electing the following officers and directors: J. L. Caldwell, of Huntington, President, and Edward Haley, of Philadelphia, Secretary and Treasurer. Directors: J. L. Caldwell, George S. Miller, Jr., Ely Ensign, Z. T. Vinon, and J. A. Trickinger, of Huntington; George McKendre, of Cabell County; J. P. Ilsley and J. H. Dinger, of Philadelphia, and J. A. Neighbert, of Logan Court House.

*Indiana Block Coal.*—The following directors were elected at the annual meeting in Brazil, Ind., July 5: Josephus Collett, L. D. Thomas, Crawford Fairbanks, George Penn, J. H. Luanan and Joshua Jump. The road is the connecting link between the Chicago & Indiana Coal and Chicago & Eastern Illinois roads.

*Memphis, Little Rock & Indian Territory.*—The directors of this new Arkansas company are: Benjamin E. Orr and Gustave A. J. Milliar, New York; F. F. Smith, James F. Fagan, of Little Rock, and J. J. Sumpter, of Hot Springs.

*Mexican Central.*—Alden Speare has been elected a member of the board of directors, to fill the vacancy caused by the death of A. B. Lawrie.

*Mexican National.*—W. G. Clark has assumed the duties of General Superintendent of the Northern Division, with offices in Laredo, Tex., vice C. A. Merriam, resigned.

*New Orleans & Northwestern.*—The officers of this Louisiana company are: President, L. M. Kidd; First Vice-President, J. H. Gramblin; Treasurer, W. F. Ashley; Secretary, J. A. Parker. Directors: T. C. Standifer, William Harper, J. B. Halstead, E. H. Smith, W. K. Duncan, J. H. Mays, J. J. Nelson, W. W. Boles, C. L. Nielson and J. I. Kidd.

*New York, Lake Erie & Western.*—The Tioga branch, which extends from Elmira to Hoytville, N. Y., 61 miles, and which has heretofore been operated as part of the Susquehanna Division, has now been made a separate division, and E. F. Knibloe has been appointed Superintendent. J. H. Parsons has been appointed Superintendent of the Westest division, to succeed Mr. Knibloe.

*Pittsburg, Youngstown & Ashtabula.*—Frank M. Lillie has been appointed roadmaster from Youngstown, O., to Kenwood, Pa., the eastern terminus of the road, with headquarters at Lawrence Junction.

*Port Townsend & Columbia River.*—The incorporators of this company are James Carroll, Alaska; H. I. Tibbals, Jr., Melville M. Buckman, and Charles A. Dyer, all of Port Townsend, W. T., and David Wallace, Seattle.

*Rome & Decatur.*—J. A. Bacon has been appointed Superintendent, with office at Rome, Ga.

*San Antonio & Aransas Pass.*—C. A. Merriam has been appointed General Manager, with office in San Antonio, Tex.

*Spuyten Duyvil & Port Morris.*—At a meeting of the stockholders this week, the following directors were elected: Cornelius Vanderbilt, William K. Vanderbilt, F. W. Vanderbilt, Chauncey M. Depew, Charles G. Clarke, Horace J. Hayden, Samuel F. Barger, John B. Dutcher, John E. Burrill, William H. Leonard, Francis P. Freeman, Joseph Harker and Alfred Van Sautvoord.

*Tacoma, Orting & Southwestern.*—The first board of directors of this company are as follows: Thomas F. Oakes, of St. Paul; Chauncy W. Griggs, James M. Buckley, Henry Hewitt, Jr., and George Browne. The principal place of business is to be at Tacoma, W. T.

*Tavares, Orlando & Atlantic.*—J. H. Durkee has been confirmed as Receiver of this road and the Tavares, Apopka & Gulf.

## OLD AND NEW ROADS.

**New Companies Organized.**—Chicago, St. Louis, Kansas City & Galveston.—Chicago, Mattoon & Cairo.—Florida Central & Peninsular.—Huntington & Guyandotte River.—Memphis, Little Rock & Indian Territory.—Tacoma, Orting & Southeastern.

**Atlanta, Atlantic & Great Northwestern.**—A copy of a mortgage has been filed in Fulton County, Georgia, by the company to secure $3,000,000 6 per cent. 30-year bonds, to be issued to provide funds for the construction of the road.

**Baltimore & Ohio.**—Within the past two weeks nearly 300 men have been discharged from the shops at Mt. Clare, Md., and on July 7 115 men were dropped from the different

departments. It is stated that the reduction of force is due to the recent sale of the road's sleeping-cars to the Pullman Company.

**Beaver Creek & Cumberland Coal Co.**—The contract for building an extension, 2¼ miles long, of the company's narrow gauge road has been relet to Wm. Nighbert & Sons. of Webster, Tenn., the original contractors, R. H. Young & Co., of Louisville, Ky., having failed to commence work. The extension is in the Cumberland Mountains, about 6 miles east of Greenwood, Pulaski County, Ky. Thomas D Lovett, Consulting Engineer, Cincinnati, O., is in charge of the work.

**California Central.**—Work will soon be commenced at Santa Monica, Cal., on the construction of a branch to that place from a point about two miles below Inglewood, on this road. The distance will be about five miles.

**Central of Georgia.**—Contracts for grading were let this week for the extension of the Buenavista & Ellaville from Americus to Columbus, Ga., which will form part of the Savannah & Columbus. The surveys for this road from Eden, Ga., westward have now been nearly all completed, and it is stated that the contracts will be let very soon. The company has secured the franchise of the Savannah & Western.

**Chattanooga Southern.**—It is stated that a syndicate of capitalists is beingformed to build this road from Chattanooga, Tenn., to Gadsden, Ala., and will soon commence work.

**Chicago, Kansas & Nebraska** —The grading has now been completed on the first 12 miles east from Colorado Springs, Col., with the exception of one cutting, which it is thought will not be completed until September. Carlisle, Price & McGavock are the contractors for this section. Tracklaying is being rapidly pushed on the 150 miles between Goodland, Kan., and the Colorado line.

**Chicago, Mattoon & Cairo.**—Charter filed in Illinois to construct a road from Chicago southwesterly to Mattoon and thence to Cairo. The capital stock is placed at $35,000. The principal office is to be in Mattoon.

**Chicago, St. Louis, Kansas City & Galveston.**—Articles of incorporation, filed in Illinois to build a road from Chicago to a point in Pike County, opposite Hannibal, Mo., and to Quincy, Ill. Francis E. Hinckley, of Chicago, who is one of the incorporators, says that "the company is not yet organized and the scheme very far from being matured."

**Chowan & Southern.**—The contract has been let to the American Construction Co. to complete the road from Norfolk to the connections with the Richmond & Danville and Atlantic Coast Line.

**Columbus, Hocking Valley & Toledo.**—The suit of John W. Shaw, President, against Stevenson Burke and others, testing the validity of $8,000,000 of stock and bonds held by Burke and other defendants, has, by consent of both parties to the suit, been transferred to J. C. Carter, of New York; E. A. Kittridge and Lawrence Maxwell, of Cincinnati, as arbitrators. They are to decide the case not later than Nov. 5, the decision to be absolutely final.

**Cornwall & Lebanon.**—The locating survey has been completed for the extension from Lebanon to Birdsboro, Pa., 30 miles, mentioned some time ago in these columns, and the contracts will be let immediately.

**Cresson, Clearfield County & New York Short Route.**—Press dispatches state that Morton, Bliss & Co., of New York, have secured a controlling interest in the road by purchasing the stock held by James S. Atterbury and John H. Boyts, the President and Vice-President of the road. Morton, Bliss & Co. own large tracts of coal and timber lands on the line of road, which extends from Cresson to Irvona, Pa , 27 miles.

**Dallas, Archer & Pacific.**—The engineers have commenced the location for the road, the party being in charge of W. P. Carter. The line was commenced at Dallas, and will be continued northwest to Archer City, Tex., about 100 miles.

**Duluth, South Shore & Atlantic.**—Over 500 men are ballasting the track between Nestoria and Iron River, Mich., where the road connects with the Northern Pacific. The men are working in four directions, west from Nestoria and east from Iron River junction. Three steam shovels are being used, and it is expected to have the road opened for through traffic by Aug. 1.

**Durham & Northern.**—About eight miles of track north from Durham, N. C., has now been completed. Work is being pushed rapidly, and much of the grading has been finished. The road is to be built from Durham, northeast about 40 miles to Henderson, N. C., on the Raleigh & Gaston.

**Fitchburg.**—A number of suits have been entered in the New York Supreme Court against this road and the Troy & Boston, by holders of consolidated mortgage bonds of the Troy & Boston, on which the interest has not been paid for a year and a half. It appears that when the Troy & Boston was sold to the Fitchburg last year the exchange of $1,500,000 seven per cent. bonds, running until 1924, for new 20-year Fitchburg debenture bonds bearing only four per cent. interest, was left to be arranged afterwards. Now most of the holders of the seven per cent. bonds claim that the agreement was made without their consent and refuse to make the exchange. Suit was begun (in the interest of the Fitchburg road, it is claimed,) in April, 1887, to foreclose the 7 per cent. mortgage, but it failed. One bondholder has just recovered judgment against the road for the interest due, costs and 5 per cent. allowance as interest overdue. It is said that other bondholders will combine in numerous similar suits. The officers of the Fitchburg road say that it was understood in the agreement that if the bonds and floating debt of the Troy & Boston necessary to be paid should exceed the $3,000,000 assigned for that purpose, the amount of the excess should be deducted from the $1,333,000 of preferred Fitchburg stock, which was to be given in payment for Troy & Boston stock.

**Florida Railway & Navigation Co.**—The sale of the divisions of this company's road, which took place some months ago, was last week confirmed by the United States Court at Jacksonville. The reorganized company will be known as the Florida Central & Peninsular, and it is stated that several extensions will be made.

**Forest City & Southeastern.**—Grading is now progressing on this road, and it is expected to have it completed early this fall from Forest City east to Gettysburg, Dak., where it will connect with the Chicago & Northwestern. The road is being largely built with the New Era grader, made by the New Era Mfg. Co., of Chicago, Ill.

**Huntington & Guyandotte River.**—Organized in Pennsylvania, to construct a road from Huntington, along the Guyandotte River to Logan C. H., to reach the coke regions. The locating survey has been completed, and it is thought that construction will soon commence.

**Kansas City & Sabine Pass.**—Contracts have been let for grading 41 miles between Pierce City and Lamar, Mo., and contracts for other portions of the road will soon be let. An effort is being made to head off other lines, which propose to build over the same general route to reach Kansas City.

**Kentucky Midland.**—A contract for constructing the road from Frankfort to Paris, Texas, has been let to Mason, Gooch, Hoge & Co., of Frankfort. The road is to be completed to Georgetown, 23 miles from Frankfort, within a year, and to Paris by November, 1889. The sub-contracts are being let.

The first ground was broken near Frankfort on July 5. "A golden spade" is said to have been used; but how much "lead" it had is not stated.

**Long Island.**—This company offers to its stockholders the privelege of subscribing at 90 and interest, until July 24, for $1,000,000 four per cent. 50 year bonds, out of a total issue of $3,000,000. The bonds are secured by a mortgage on the company's entire property, and the proceeds of those now offered for sale are to be used to pay for new equipment and to meet the cost of the Oyster Bay extension, now being built, which is estimated at $250,000.

**Marshfield & Southwestern.**—Grading is in progress on the first seven miles of this road from Marshfield, Wis., toward Vesper.

**Maryland Central.**—The Court has relieved Mr. Samuel Spencer of his duties as one of the receivers of this road at his request, and W. Gilmor has been made sole receiver.

**Marysville, Sutter City & Colusa.**—It is stated that the greater part of the right of way has been secured for this road, which it is proposed to build from Marysville west to Colusa, Cal., about 25 miles. A large bridge is projected over the Sacramento River.

**Memphis, Little Rock & Indian Territory.**—Chartered in Arkansas to build a road from Little Rock to Hot Springs and thence westerly through the counties of Garland, Montgomery, Pike, Polk, Howard and Savier, to the Indian Territory. The capital stock is $6,400,000.

**Meriden, Waterbury & Connecticut River.**—The extension from Cromwell to Waterbury was opened for regular traffic July 9.

**Mexican Central.**—The road was in running order July 3, after the serious floods of the previous week. Washouts occurred at intervals for 100 miles, but there were no bridges destroyed and the first accounts were greatly exaggerated. The latest accounts place the number of persons drowned at Leon and near there at 700.

**Mexican Roads.**—*The Colima branch of the Mexican National.*—This road was started from Manzamillo in 1881 under the charge of J. Foster Flagg and about 35 miles were built, nearly parallel with the coast, to America, when construction was discontinued with about 1¾ million dollars worth of construction material on hand. A preliminary agreement has now been made between Governor Gomez, of the State of Colima, and the Mexican National Construction Co. to continue the road to Colima, some 32 miles.

The company is to secure from the State of Colima $85,000 and an advance payment on account of subsidy from the general government of $75,000. The work of construction is to be commenced by Oct. 1, and to be finished in one year. The surveys are under the direction of Mr. H. H. Filley.

On the completion of the road to Colima, construction is to be pushed on to Gaudalajara, when it will meet the branch road of the Mexican Central, and will doubtless either meet with or be intersected by the Mosclia branch of the Mexican National.

A concession for a railroad from Tonala, in the State of Chiapas (on the Pacific and about 50 miles east of the Boca Barra, the proposed Pacific terminus of the Tehuantepec ship railroad) and Mal Paso, or any other pcint on the river Chiapa or Grijaloa, from which the river is navigable to the Gulf of Mexico, has been granted, with a subsidy of $12,903 per mile from the general government, and $1,612 from the state of Chiapas. The government subsidy to be paid in a 6 per cent. bond at 90, to be known as the "Chiapas Railway Bonds." Construction to commence by March of next year. The road to be finished in eight years. The estimated length of main line is 190 miles, with a branch to San Cristobar, the capital of the state, 50 miles long.

Besides the wood and usual agricultural productions of a rich tropical country the Mexican *Financier* says that there are on the route extensive deposits of coal, a mountain of magnetic iron ore, gold, silver, copper and argentiferous lead mines. The outlet of this road towards the north will be by about 200 miles of river navigation to Frontera, a port of call for the Alexandre line of New York and Vera Cruz steamers. As Frontera is about 120 miles east of the mouth of the Coatzacoalcos, the road will hardly do any through oceanic business after the ship railroad is built, but the local traffic will doubtless be large, and the subsidy should nearly cover the cost of the road, which is to be of standard gauge.

*Pachuca & Tampico.*—A concession for either a standard or narrow gauge railroad between these two points has been granted to Leon Baldy with a subsidy of $6,000 per kilometre if a standard guage is adopted or $4,500 for a narrow gauge.

**Missouri, Kansas & Texas.**—A Topeka dispatch of July 8 reports that suits have been begun in the Supreme Court by this company and by speculators who have recently bought land from the road to eject about 200 settlers in Allen County, who have occupied their farms for a dozen years or more. The suits cover about 30,000 acres, which the road claims by a grant from Congress in 1882. The settlers say that these lands are not covered by the grant.

**Monterey & Tampico.**—The surveys for the road are progressing rapidly, and it is expected to have all preliminary work finished by Sept. 1, ready for letting contracts. A reconnaisanc of the entire line indicates a road with easy grades and moderately light work, through a very productive country, largely under cultivation, with abundant permanent water supply for irrigation and for railroad use. C. S. Masten, Phœnix, Ariz., is Chief Engineer.

**Munidie.**—Bids are asked for constructing this road from Young's Mills, opposite River Hebert, N. B , and thence to Munidie, crossing the Joggins road.

**New Castle & Shenango Valley.**—Tracklaying has been commenced and is being pushed vigorously. Over 1,000 tons of rails have been delivered, and it is expected to have all the work completed by October. The road is to extend from New Castle to West Middlesex, Pa., about 19 miles, and will be operated by the New York, Pennsylvania & Ohio.

**New London Northern.**—Fire broke out in the repair shops at East New London, Conn., early July 10, and the repair shop and storage building, with their contents, were destroyed, as well as three freight-cars. A number of locomotives and passenger-cars in the round-house adjoining were removed. The total loss is estimated at $50,000, which is about half covered by insurance. A large number of mechanics lost all their tools which were stored in the building. The fire is thought to be incendiary.

**New Orleans & Northwestern.**—The company is endeavoring to secure funds for the construction of its narrow gauge road, which it is proposed to build from Ruston, on the Vicksburg, Shreveport & Pacific, southeast to Columbia, where connection is to be made with a line of boats running to New Orleans. The distance is about 40 miles.

**New Roads.**—A proposition made by a contractor to build a road from Hawkinsville, Ga., to Fullington's Mill, on the Georgia Southern & Florida, a distance of 18 miles, for $50,000, has been accepted by the citizens of Hawkinsville, and a survey will be commenced immediately.

Public meetings have been held at Turner, Me., in favor of a proposed narrow gauge road in the Androscoggin Valley, to extend from Turner to Livermore.

**New York, Mahoning & Western.**—The election held last week in Fort Wayne, Ind., on the proposition to vote $200,000 to the company for erecting shops in the city with a capacity of employing 1,800 men, resulted in a majority for the proposition.

**Ohio Southern.**—The preliminary surveys are now being made for the proposed extension from Jackson easterly to Pomeroy, O., on the Ohio River. The distance is about 30 miles.

**Oregon Railway & Navigation Co.**—Work is being rapidly pushed on the Washington & Idaho division, and about 12 miles have now been graded from Farmington, W. T., toward the Cœur d'Alene mines, on the Montana division.

**Oxaco & Pacific.**—Surveys have been commenced at Tehuacan, state of Pueblo, for this Mexican road, and in the fall they will be run between Oxaco and the Pacific Ocean.

**Philadelphia & Reading.**—President Corbin has announced that the new securities will be issued between July 10 and Aug. 10 in exchange for certificates as follows: On and after July 10, certificates representing the Schuylkill Navigation Co., the Susquehanna Canal Co., Colebrookdale Railroad Co., Pickering Valley Railroad Co. On and after July 25, income mortgage bonds, convertible adjustment scrip, debenture and guarantee scrip. On and after July 30, first and second series 5 per cent. consolidated mortgage bonds, convertible and debenture bonds, preferred stock, and Coal & Iron Co. debenture bonds. On and after Aug. 6, deferred income bonds. On and after Aug. 10, Brown Brothers & Co.'s certificates for common stock.

**Port Jervis & Monticello.**—It is reported that the New York, Lake Erie & Western has notified this road that it will not henceforth exchange freight cars with it, thereby crippling a considerable coal traffic which has no other channel. The road has used the Erie terminal facilities at Port Jervis at a fixed rental for several years, but was a few months ago excluded, and has had to provide an independent station in another part of the town. A considerable summer passenger traffic has to be transferred by wagon. It is said that this action on the part of the Erie is due to its jealousy of the local road, which is building a line to connect with the New York, Ontario & Western that will open a route to New York city which will compete with the Erie line.

**Richmond & Chesapeake.**—The Richmond Tunnel & Construction Co. has sublet the contract for the construction of the tunnel at Richmond, Va., to J. C. Carpenter & Co. During the progress of the work the tunnel is to be lighted by electricity.

**Rome.**—The controlling interest in this road held by the Georgia Co., has been sold to parties interested in the Chattanooga, Rome & Columbus. The road extends from Rome to Kingston, Ga., 20 miles, and has valuable terminal facilities in Rome.

**St. Catharines & Niagara Central.**—The road was opened for both freight and passenger traffic last week from St. Catherines, Ont., to Niagara Falls.

**St. Louis & Cairo Short Line.**—It is stated that President Parker has agreed to extend the El Dorado Division from Raleigh, Ill., easterly to the Ohio River, to connect with the proposed Princeton, Marion & Ohio.

**St. Louis, Arkansas & Texas.**—The locating survey between Malden and Delta, Mo., is reported as completed, and grading is also reported as commenced at Malden. From Delta trains will run over the Cape Girardeau Southwestern to Cape Girardeau, Mo.

**St. Louis & Chicago.**—The company has filed for record in the office of the Secretary of State at Springfield, Ill., a copy of a 40-year $1,000,000 mortgage, made to the Holland Trust Co., of New York, to provide funds for building bridges and branches, increasing terminal facilities, etc.

**Salt Lake Valley & Eastern.**—Grading is reported to be in progress on this road, which it is proposed to build from Ogden, Utah, east toward Sioux City, Ia.

**San Antonio & Aransas Pass.**—President Lott has agreed to build the culverts, bridges, and furnish the ties and rails for the proposed extension from Comfort through Gillespie and Llano counties to Llano City, a distance of about 60 miles, if the right of way and depot grounds are furnished and the road is graded. The line is through a rich mining region.

Tracklaying is nearly completed on the branch to Rockport, Tex. Grading has been commenced on the extension to Houston, and the locating survey has been completed within the city limits. F. Lovett is engineer in charge of the Houston extension.

**Sault Ste. Marie & Southwestern.**—Press dispatches state that $6,000,000 of bonds have been placed in New York and Montreal for the construction of the road, which it is proposed to build from Rhinelander, Wis., southwest to Merrill, thence through Marathon and Clark counties, crossing the Wisconsin Central near Abbotsford, and the Chicago, St. Paul, Minneapolis & Omaha at Fairchild, Eau Claire County; from there to Osseo, over a road already built, thence through Trempealeau and Buffalo counties, crossing the Mississippi above Alma, and thence to a connection with the Union Pacific at Council Bluffs, Ia. The road would give a short connection between the Union Pacific and the Canadian Pacific. The contract for constructing the road has been let to R. W. McIntire & Co., of Eau Claire, Wis.

**Southern Pacific.**—Tracklaying has been completed on the branch from Anaheim via Orange to Tustin.

**Tacoma, Orting & Southeastern.**—Charter filed in Washington Territory, by officers of the Northern Pacific, to build a road from a point on the Cascade division of that road, between the city of Tacoma and the Cascade Mountains, thence southerly toward the Cascade Mountains, with such branches as may be decided upon. The capital stock is to be $900,000.

**Utica, Adirondack & Saratoga.**—At a meeting of the board of directors last week it was decided that the line

surveyed from the Rome, Watertown & Ogdensburg, between Prospect Station and Rensem, thence to Gang Mills, Grant, Ohio, Wilmurt and Noblesboro, with a branch from Grant to near Northwood, N. Y., be adopted as the route for the road. Efforts are being made to obtain a subscription of $25,000 in Utica, and $30,000 more along the line of the proposed road. If these are obtained contracts will be let and construction begun.

**Wabash.**—Judge Gresham last week rendered a decision for the plaintiffs, Brown & Patton, in the matter of their claim for rental for the use of the Toledo Peoria & Western by the Receiver of the Wabash. The amount of the decree is $257,790. The decision says: First, the Wabash Co. has only a leasehold interest in the property of the road, and by the terms of the lease that interest was liable to be forfeited for the non-payment of rent. The Wabash Co. agreed to pay as part of the rent the interest, as it became due, upon the first mortgage bonds of the Toledo, Peoria & Western. The mortgage which the Wabash Co. executed, and which was foreclosed, bound the leasehold interest in the Toledo, Peoria & Western, and nothing more. The relations between the Wabash and the T., P. & W. at the time Humphreys and Tutt were appointed Receivers under the orders of the Court were invested with the entire estate of the Wabash Co., including its leasehold interest in the T., P. & W. The Receivers thus became assignees of the lease, and as such liable for the rent. Second, the Wabash suit was commenced to preserve intact the Wabash system for the benefit of that company and its creditors and stockholders. In order to do this, it was necessary to prevent the forfeiture of leases, including that of the T., P. & W., and the action of the Court, including the appointment of the Receivers, plainly indicated that the rent would be paid upon the leased lines. At the time the latter suit was commenced, neither rent under the lease of the T., P. & W. nor interest on its first mortgage bonds was in arrears; and, therefore, neither the T., P. & W. nor the trustees in its first mortgage had any right to demand possession of the leased property. Third, the receivership embraced only the property of the Wabash Company, and the Court took possession of the property of the T., P. & W., for the benefit of the Wabash Company and its creditors and stockholders. No part of the expenses of the receivership can, therefore, be properly chargeable against the T., P. & W. property. Fourth, the Toledo, Peoria & Western was operated by the Receivers from May 28, 1884, to June 10, 1885, and the rent which accrued during that period applicable to the payment of interest on the first mortgage bonds amounted to $321,080, which amount is due from the Receivers to the trustees in the first Toledo, Peoria & Western mortgage, less $99,571 already paid by the Receivers on that account. Fifth, the right of this Court to decree upon the claim of the trustees in the first mortgage of the Toledo, Peoria & Western for rent and for the use of the leased property during the time it was in the possession of Humphreys and Tutt, as Receivers, is provided for and recognized in the orders and decrees of the court in the Wabash suit at St. Louis.

In the United States Circuit Court, at Springfield, Ill., the attorneys for a minority of the stockholders of the road, representing $3,000,000 of the capital, asked to be made parties to the pending litigation. They allege that the road is worth more than the purchasing committee is willing to pay for it, and that the reorganization is a scheme to sell the property for less than its value. The purchasing committee's attorneys allege that the petitioner's rights are fully protected, and claim that the granting of the petition would embarrass and delay the settlement without benefit. The case was taken under advisement.

**Western & Atlantic.**—The passenger traffic on this road has increased in a marked degree since the reduction of about 20 per cent. in rates four months ago. General Passenger Agent Brown states that the increase in ticket sales during March was 38 per cent. over the same month last year; in April 54 per cent., and in May 28 per cent. He attributes this improvement very largely to the reduction in rates, as there has been no considerable increase in activity of business along the line.

**Williamsport & Binghamton.**—Many of the stockholders recently made a trip over the line of this proposed route, and it is reported that an early commencement of construction was decided upon.

## TRAFFIC AND EARNINGS.

### The Inter-state Commerce Law.

The United States Senate on Monday of this week passed the bill making amendments to the "Act to regulate commerce." Its chief points are these:

Requiring reductions in published rates or fares to be made only after three days' public notice.

Prohibiting advances in joint rates except after ten days' notice to the Commission.

Adding imprisonment in the Penitentiary to the penalty provided for a violation of the law as to unlawful discriminations in rates.

Making false billing, false classification, false weighing or false report of weight a misdemeanor, punishable by a fine of not exceeding $5,000 and imprisonment in the Penitentiary for not exceeding two years for each offense.

Making the payment of any consideration to induce unjust discrimination a misdemeanor, subject to the like penalty.

Providing that the act shall not be construed so as to prevent the free carriage of destitute and homeless persons, transported by charitable societies, and of the necessary agents employed in such transportation, or the giving of reduced rates to municipal governments for the transportation of indigent persons, or the making of arrangements with national or state homes for the transportation of soldiers.

Mr. Reagan offered an amendment (which was agreed to) giving the United States Circuit and District courts jurisdiction of violations of any person or firm, with power to issue a peremptory writ of mandamus.

The subject was further discussed by Senators Wilson, Pugh, Cullum, Dawes, George, McPherson, Reagan and Blair, and the bill was passed.

### The Inter-state Commerce Commission.

The Commission met July 10 at Long Branch, to hear the complaints of certain peach growers of the western part of New Jersey against the Central Railroad of New Jersey and the Lehigh Valley. Commissioners Schoonmaker, Walker and Bragg were present. The peach growers said that the roads carrying peaches to New York had combined so as to keep up the rates. The rate to New York from Flemington and vicinity is eleven cents per basket. California peaches are brought to New York in refrigerator cars and sold as low as the New Jersey fruit. The Central of New Jersey asserted that the railroad companies made no money out of their peach traffic. The general freight agent testified that there was no inter-state traffic in peaches over that road eastward, because all the fruit was delivered in Jersey City. The general freight agent of the Lehigh Valley stated that the average daily earnings of a peach car during the peach season is $41.40.

### Central Traffic Association.

The Freight Committee of the Central Traffic Association, at Chicago, July 10, agreed upon the following recommendations to be submitted to the general managers: That rates on pig-iron and articles of iron be the same in both directions; that weights by public elevators recognized by Boards of Trade be accepted on grain when promptly certified to; that milling in transit arrangements be continued on a minimum basis of 1½c. per 100 lbs. higher than the rates on grain from original point of shipment to agreed destination of the product; that milling in transit privileges be extended to wheat, corn and oats only.

### Iowa Rates.

The arguments of the railroads before the United States Court at Leavenworth, Kan., in the injunction suits brought against the Iowa Commissioners, are reported as elaborate and exhaustive, but the telegraphic account merely summarizes the same points published a week ago, when the suits were begun.

"The counsel for the Commissioners contends that the law is just and the schedule reasonable; that the railroads themselves have made lower rates voluntarily in numerous instances. The rates adopted by the Chicago, Burlington & Quincy Dec. 20, 1887, in Illinois, and conformed to by most of the other roads, were used by the Commissioners as a basis for the Iowa schedule. The Commissioners say the Illinois Central voluntarily operated under the same tariff on its Iowa lines in 1887, and that it was the custom of the roads to give rates 25 to 30 per cent. below the published tariff to shippers all over the state."

The decision will not be rendered for several days, and it is expected that an appeal to the United States Supreme Court will be taken whichever side wins.

### Mississippi Rates.

The Illinois Central has issued a local freight tariff on its Southern Division which ignores the tariff fixed by the State Commission of Mississippi. This state tariff has been in operation about two years, and the new rates are from 20 to 50 per cent. above it. It is expected that the Commissioners will bring suit to recover the penalties prescribed by law for violating the state tariff. The Jackson *Clarion* gives the following comparisons: The rate by the Commissioners' tariff for 25 miles was 3¾ cents per 100 lbs. on lumber, but by the rate as fixed by the company it is increased to 5 cents. For 50 miles it was 5 cents, and has been advanced by the company to 7½. For 100 miles it was 7¼ cents, and is advanced to 10 cents, and so on. On cotton the rate was 70 cents per bale for 25 miles, and is advanced to $1.20. For 50 miles it was 95 cents, as against the new rate of $1.70. For 100 miles it has been increased from $1.25 to $2.20, and for 150 miles from $1.50 to $2.70, and so on for all other distances in about the same proportion.

The penalty imposed by the law for violating the regulations made by the Commission is a fine of $500 for each violation, to be recovered by suit instituted by the commission.

### Colorado Rates.

The direct lines between the East and Colorado have come to an agreement with the Denver, Texas & Fort Worth, and an advance in freight rates from Chicago, St. Louis, Kansas City and New Orleans to Denver and common points is announced to go into effect July 12. From Chicago and New Orleans the new first-class rate is $2.30, an advance of 50 cents on the rates heretofore in effect; from Kansas City, $1.60, an advance of 30 cents; from St. Louis, $2.10, an advance of 50 cents; and from New York, by the trunk lines, on a basis of first class, $2.92.

### Trunk Line Rates.

Rates on dressed beef from Chicago to New York have been reduced still farther the past week. The Erie has made reductions of 2 or 3 cents at a time and has been each time followed by the other lines, and the rate now stands at 10½ cents; the rate to Boston however is 22c. Live stock rates have been reduced in sympathy and are now only 5½ cents Chicago to New York. Provisions and some other commodities have also been reduced. The Grand Trunk has given notice that it will advance the dressed beef rate to 30 cents on July 16. The Baltimore & Ohio on Tuesday put into effect a rate of 3½ cents per 100 lbs. on cattle from Chicago to Baltimore, the Pennsylvania meeting the cut.

The Saint Paul, Minneapolis & Sault Ste. Marie announces that its freight rates from New York to Chicago via the New York, Ontario & Western will be rest red on July 15.

Rates from Chicago to New York by lake and rail were reduced on July 6 by the Erie, New York Central and Delaware, Lackawanna & Western to a basis of 30 cents first-class. The Central Vermont issued a tariff 3 cents lower than this, or 27 cents first-class.

A Chicago dispatch of July 8 states that the Chicago, Burlington & Northern is taking freight from New York and Boston to St. Paul on a tariff based on 50 cents first-class. This is doubtless a lake and rail tariff.

Rates on grain from Chicago to Buffalo by lake are firm, wheat being taken at 2¼ cents per bushel.

The St. Paul, Minneapolis & Sault Ste. Marie announces that it will take St. Paul freight from New York by the Lehigh Valley to Buffalo and thence by boat to Gladstone, Mich., the rates being on a basis of 60 cents first-class.

### Nebraska Rates.

The new tariff of local rates issued by the State Board of Transportation, and ordered to go into effect on the roads of the state July 20, is calculated to effect a reduction on car load lots and on the coarser kinds of freight, the first class being left unchanged and the second reduced but a little. The Nebraska *State Journal* gives the following comparison with the distance tariff of the Union Pacific of Nov. 1, 1887:

On 100 miles:

| | 1st. | 2d. | 3d. | 4th. | 5th. | A. | B. | C. | D. | E. |
|---|---|---|---|---|---|---|---|---|---|---|
| Present rate. | 52 | 45 | 40 | 35 | 30 | 24 | 16 | 14 | 10 | 7 |
| New state rate. | 52 | 44 1-5 | 34⅔ | 26 | 20 4-5 | 20 4-5 | 18 1-5 | 15 | 13 | 10 2-5 |

On 200 miles:

| | 1st. | 2d. | 3d. | 4th. | 5th. | A. | B. | C. | D. | E. |
|---|---|---|---|---|---|---|---|---|---|---|
| Present rate. | 73 | 65 | 58 | 46 | 41 | 34 | 26 | 22 | 16 | 10 |
| New state rate | 73 | 63 | 48 3-5 | 36⅔ | 29 1-5 | 29 1-5 | 24⅔ | 21.9 | 18¼ | 14 3-5 |

The rates prevalent in Iowa (tariff of May 10) are as follows:

On 100 miles:

| 1st. | 2d. | 3d. | 4th. | 5th. | A. | B. | C. | D. | E. |
|---|---|---|---|---|---|---|---|---|---|
| 38 | 32.3 | 25.3 | 19 | 15.2 | 15 2 | 11.4 | 9⅛ | 8.6 | 7 |

On 200 miles:

| 1st. | 2d. | 3d. | 4th. | 5th. | A. | B. | C. | D. | E. |
|---|---|---|---|---|---|---|---|---|---|
| 50 | 42½ | 33.3 | 25 | 20 | 20 | 15 | 12½ | 11.3 | 10 |

### Railroad Earnings.

The following is the statement of earnings and expenses of the Atchison, Topeka & Santa Fe for the month of May and the year to that date:

*Month of May:*

| | 1888. | 1887. | Inc. or Dec. | |
|---|---|---|---|---|
| Miles of road operated | 3,021 | 2,446 | I. | 575 |
| Gross earnings | $1,258,968 | $1,553,718 | D. | $294,750 |
| Oper. expenses (exclusive of taxes) | 885,964 | 895,547 | D. | 9,583 |
| Net earnings | $373,004 | $658,172 | D. | $285,168 |

*Five months—Jan. to May:*

| | 1888. | 1887. | Inc. or Dec. | |
|---|---|---|---|---|
| Miles of road operated | 3 015 | 2,446 | I. | 569 |
| Gross earnings | $5,838,162 | $7,549,758 | D. | $1,711,596 |
| Oper. expenses (exclusive of taxes) | 4,263,990 | 4,057,836 | I. | 216,154 |
| Net earnings | $1,574,172 | $3,491,922 | D. | $1,917,745 |

The gross and net earnings of the Chicago, Burlington & Quincy for May, and the five months ending May 31, were as follows:

*May:*

| | 1888. | 1887. | Inc. or Dec. | |
|---|---|---|---|---|
| Gross earnings | $1,749,187 | $2,152,072 | D. | $402,885 |
| Oper. expenses | 1,685,512 | 1,284,967 | I. | 400,545 |
| Net earnings | $63,675 | $867,105 | D. | $803,430 |

*Jan. 1 to May 31:*

| | | | | |
|---|---|---|---|---|
| Gross earnings | $8,022,032 | $11,135,272 | D. | $3,113,240 |
| Oper. expenses | 7,083,203 | 6,001,841 | I. | 1,081,362 |
| Net earnings | $938,829 | $5,133,431 | D. | $4,194,602 |

The statement of the business of all lines of the Pennsylvania east of Pittsburgh and Erie for May, 1888, as compared with the same month in 1887, shows

| | |
|---|---|
| An increase in gross earnings of | $162,719 |
| An increase in expenses of | 290,526 |
| A decrease in net earnings of | $127,807 |

The five months of 1888, as compared with the same period of 1887, show

| | |
|---|---|
| An increase in gross earnings of | $1,318,933 |
| An increase in expenses of | 1,420,687 |
| A decrease in net earnings of | $101,704 |

All lines west of Pittsburgh and Erie for the five months of 1888 show a deficiency in meeting all liabilities of $89,888, being a loss as compared with the same period of 1887 of $344,336.

The statement of the Philadelphia & Reading for May, as compared with the same month last year, shows

| | |
|---|---|
| An increase in gross earnings of | $448,834 |
| An increase in expenses of | 488,058 |
| A decrease in net earnings of | $39,224 |

The statement for the six months ending May 31, 1888, as compared with the same period in 1887, shows

| | |
|---|---|
| A decrease in gross earnings of | $2,063,625 |
| A decrease in expenses of | 532,660 |
| A decrease in net earnings of | $1,530,965 |

### Cotton.

The cotton movement for the week ending July 6 is reported as follows, in bales:

| *Interior markets:* | 1888. | 1887. | Inc. or Dec. | P. c. |
|---|---|---|---|---|
| Receipts | 4,103 | 1,726 | I. 1,377 | 81.0 |
| Shipments | 10,767 | 5,375 | I. 5,392 | 99.8 |
| Stock | 45,930 | 38,253 | I. 7,737 | 20.2 |
| *seaports:* | | | | |
| Receipts | 6,410 | 1,261 | I. 5,141 | 395.5 |
| Exports | 37,952 | 18 162 | I. 19,790 | 108.7 |
| Stock | 247,412 | 249,312 | D. 1 900 | .76 |

### Coal.

The coal and coke tonnage of the Pennsylvania originating on lines east of Pittsburgh and Erie for the week ending June 30, and the year to that date, was as follows:

| | Coal. | Coke. | Total. |
|---|---|---|---|
| Total for week ending June 30 | 226,486 | 70,448 | 296,934 |
| Total for year 1888 to date | 5,822,561 | 1,928,880 | 7,751,441 |
| Total for year 1887 to date | 5,222,259 | 1,653,793 | 6,886,052 |

The anthracite coal tonnage of the Belvidere division of the United Railroads of New Jersey division for the same periods was as follows:

| | 1888. | 1887. | Dec. |
|---|---|---|---|
| Total for week ending June 30 | 14,965 | 20,093 | 5,127 |
| Total for year to June 30 | 750,243 | 872,559 | 122,316 |

The coal tonnages for the week ending July 7 are reported as follows:

| | 1888. | 1887. | Increase. | P. c. |
|---|---|---|---|---|
| Anthracite | 671,382 | 573,572 | 97,810 | 17 05 |
| Bituminous | 309,359 | 257,487 | 51,872 | 20.14 |

The Cumberland coal trade for the week ending July 7 amounted to 63,254 tons, and for the year to that date 1,780,620 tons.

### Earnings of South Carolina Roads.

The Railroad Commissioners of South Carolina issue the following report of the earnings of the railroads in the state for the month of May, as compared with the same period last year. Of the 26 roads included in the report, all but 8 show an increase in net earnings. The total earnings were $488,536, against $418,322 in May, 1887, showing a total net increase of $66,369. The total freight earnings for the month were $282,172, and the passenger earnings, $159,033, against $234,668 and $136,119, respectively, in May, 1887. The Richmond & Danville system shows a net increase in earnings of 15.23 per cent.

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